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The November (Philadelphia) Number of the *Medical Clinics of North America* includes a *16-Clinic Symposium on Arthritis* which is outstanding for the practical help it gives on the diagnosis and treatment of this common and important disease. This Symposium, headed by Dr. Ralph B. Pemberton, includes clinics on Rheumatoid Disease, Integration and Coordination of Therapy, Roentgen Aspects of Chronic Arthritis, The Blood in Arthritis, Fibrositis, Metabolic and Dietetic Considerations in Treatment of Arthritis, Focal Infections, Physical Therapy in Treatment of Chronic Arthritis, Present Status of Endocrine Therapy in Arthritis, Diagnosis and Treatment of Low Back Pain, etc., etc.

Furthermore, in addition to this Symposium, the November Number also contains *8 other practical clinics* dealing with problems that frequently arise in everyday practice.

Postgraduate Teaching—that's what this November Number gives you—that's what *every number* of the Medical Clinics of North America gives you—that's why these "Clinics" have gained the endorsement and approval of thousands of practicing physicians.

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PSYCHOTIC AND SOMATIC INTERRELATIONS

WILLIAM F. PETERSEN, M.D.
CHICAGO
AND
HANS H. REESE, M.D.
MADISON, WIS.

It is curious that the appreciation of the interrelation of mental and biochemical rhythm has been so long delayed. Now it would seem that almost overnight "psychobiology" has been achieved although actually Adolf Meyer has been devoted for years "to the reactions of the unitary organism and the study of man as a person."

There have been at least two impediments: First, the biochemist has shunned long time observations on the human subject, although Otto Folin some thirty-five years ago [1] pointed out the absolute necessity of such an approach.

The biochemist, usually studying single samples of blood from presumably "normal" persons, has set up a series of so-called normal standards, quite overlooking the fact that even normal persons, when studied over long periods, may reveal deviations of considerable magnitude—not only in such basic values as the p_H, the carbon dioxide content and the chloride concentration of the blood but in the values for calcium, potassium, sugar or cholesterol.

The biochemical study of the psychotic patient is essentially a dynamic, not a static, problem—it involves evaluation of levels that may be critical for the individual under observation, even though they lie within the statistically "normal" range.

Second, the psychiatrist is preoccupied with the intangibles of psychopathology, of psychosomatics and of psychoanalysis and with the relative details of miscellaneous social and domestic environmental factors that presumably might shed light on psychic reaction.

We will begin by stressing the fact that the psychotic person lives in an atmosphere and that atmospheric environment in this region of the world varies tremendously from day to day. Most psychiatrists are in agreement that the psychically disintegrated and the psychotic patient are very susceptible to "behind the scene" environmental alterations of all kinds, that they are unusually unstable and readily fatigued organisms.

We will agree that the tissues of the central nervous system are most susceptible to change in oxygen tension. Combining these several lines of agreement, we might inquire whether the patient with a psychotic predisposition may not be unusually susceptible to changes in weather, because weather is concerned with oxygen supply. Weather provides the kind of air that one breathes.

It is impossible to enter into the detailed analysis of metabolic phase fluctuations in the space here available. Suffice it to say that every organism is constantly pendulating between poles of normality: (*a*) from increase in blood pressure, on the one hand, to decrease, on the other, (*b*) from a period of high metabolic rate to one of low, (*c*) from depressed oxidation or preponderant reduction to one of adequate oxidation and lessened reduction, (*d*) from dehydration to hydration and (*e*) from increased cellular permeability to decreased cellular permeability.[2]

MOODS IN THE NORMAL LEPTOSOMATIC AND PYKNIC

Practically every normal person is aware of occasional change in mood, the intangible and possibly subconscious perception or awareness either of somatic equilibrium or of departure from normal equilibrium in the direction of greater exhilaration and buoyancy or of depression (thymergasia), the feeling of inadequacy and futility (parergasia).

While the perfectly normal and well equilibrated person will reveal fewer swings in moods, the somatic variants in either direction (the pyknic and the leptosomatic type) are less stable, and in these groups one finds a distinct increase in the number of persons who reveal more marked shifts in mood. During youth the pyknic individual is usually very stable but occasionally has periods of behavioristic disorders;[2] in the leptosome periods of elation or depression, particularly depression, are more common.

The moods can be identified with a shift in blood chemistry. In general the pyknic individual does not experience change in mood with periods of greater acidity, i. e. lower p_H. However, with periods of increased alkalinity there frequently is associated the feeling of greater energy, restlessness and exuberance. Then may follow irritation, explosive anger, temper tantrums, and the like.

The leptosome reveals less reaction to a swing in the alkaline direction. An increase in the p_H of the blood does not bring about much of a shift toward a feeling of buoyancy. Periods of decrease in the p_H are definitely associated with "blueness," depression and finally irritability in many persons of this type.[3]

Read before the Section on Nervous and Mental Diseases at the Ninety-First Annual Session of the American Medical Association, New York, June 12, 1940.

From the Department of Pathology, Bacteriology and Public Health of the University of Illinois College of Medicine and the Department of Psychiatry, University of Wisconsin Medical School.

1. Folin, Otto: Some Metabolism Studies with Special Reference to Mental Disorders, Am. J. Insan. **60**: 699, 1903-1904; **61**: 299, 1904-1905.

2. Petersen, William F., and Milliken, Margaret E.: The Patient and the Weather: (*a*) Autonomic Integration, Ann Arbor, Mich., Edwards Brothers, Inc., 1936, vol. 1, pt. 2; (*b*) Mental and Nervous Disease, ibid. 1934, vol. 3.

3. Similiar pendulations of rhythm in many of the other blood constituents and physiologic mechanisms have been determined (Petersen and Milliken [2a]).

If change in weather can affect the blood chemistry so profoundly, may it not be expected that the abnormal psychobiologic status may at times shift to normal or a phase of quiescence and relative adjustment or that disturbance and a psychopathologic state may be precipitated by meteorologic disturbances?

WEATHER CONDITIONING OF THE PSYCHOTIC STATE

In order that our study may be wholly free from personal selection or bias, we turn to the first American day by day study of changes in the psychotic patient, with coincidental clinical vascular and blood cytologic studies, published by Dr. Francis M. Barnes Jr. in 1909.[4]

As the observations are dated and graphed, they afford an opportunity of immediately associating the clinical and laboratory studies with the meteorologic conditions of the time.

In chart 1, Dr. Barnes's graph is subtended below a meteorogram of Baltimore for the period concerned. Characteristic psychic alterations, with periods from the beginning of the disturbance to recovery, are indicated on the Barnes graph by black bars, which are numbered from 1 to 7. While Barnes observed the rather characteristic psychotic change and associated mental alterations and cited some laboratory observations, we are here interested only in the dated mental changes associated with the precipitation of the acute attack.

An excerpt from Barnes's case record follows:

"CASE 1.—No. 541, male, aged 46.

"*Anamnesis.*—One brother and one sister are characterized as 'neurotic,' and one sister developed a psychosis from which she did not recover; otherwise, the history is unimportant. No alcoholic or drug addictions. . . . As a child he had some mild convulsive attacks, and in boyhood there was a trifling head trauma.

"The first mental attack occurred about 1890, when he was twenty-eight or nine years old.

"*1900.*—Since his last admission, the attacks have become more frequent and of shorter duration. At the onset, there is noted motor-restlessness, insomnia, irritability, inaccessibility and irrelevance. The excitement rapidly reaches its height, and auditory and visual hallucinations are present. During this time he is careless in person and habits. The attacks average now, from five to six weeks in duration. The only change is the appearance recently, of short periods of mutism, posing, etc., in an otherwise excited day.

"*Present Condition.*—On reviewing the condition for the past year, one finds that the changes which have taken place have been those of detail only. As a general rule, the patient exhibits no prodromal signs by which the beginning of an 'abnormal' period can be detected. Occasionally for a period of from twenty-four to forty-eight hours he may appear drowsy and disinterested in his usual pastimes. The onset may occur in either one of two ways: after a night's undisturbed sleep, he may awake mute and resistive; later in the day this mutism may be interrupted by a psychic elevation with marked logorrhea, irrelevancy in answers and inaccessibility, with slight distractibility, which condition, however, is soon replaced by the former one of mutism and resistiveness. The most common onset is that with mild excitement which persists for several hours and is replaced by a mute, resistive phase. During the excited phase he is quite inaccessible; attention is poor or wanting and there is but little distractibility or divertibility; association is rapid but imperfect. Occasionally one may get a reply to questions, but the replies are irrelevant in the extreme. Irritability is often marked; logorrhea is continuous, the stimulus apparently is mostly internal, but at times the trend of thought is obviously influenced by outside events.

"The average course of an attack varies somewhat. As a general rule, after a few hours of mild excitement there follows a period of from five to ten days' duration during which he will remain in bed, mute and resistive. Occasionally during this period a condition of mild excitement will return for transient intervals. During the first few days he is untidy in person."

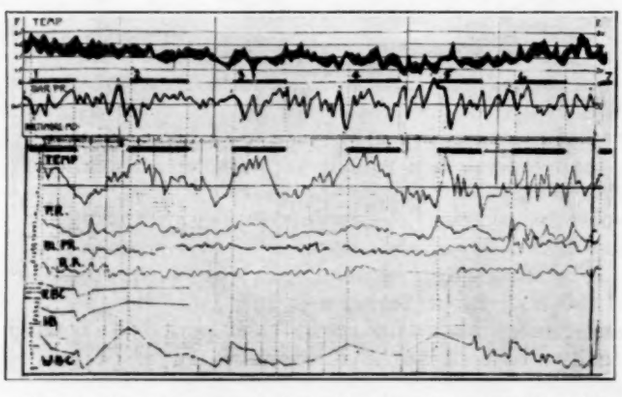

Chart 1.—Barnes's curve of observations in case 1. The heavy black lines represent periods when the patient was passing through an attack—"abnormal" days. These are numbered from 1 to 7. The curves for temperature, pulse rate, blood pressure, respiratory rate, red blood cell count, hemoglobin and white blood cell count follow, in the order given. After Feb. 21, 1908, the observations are dated. The meteorogram for Baltimore has been superimposed. It indicates daily maximum and minimum temperatures, as well as barometric pressures. Note that periods of increase in barometric pressure precede the onset of attacks.

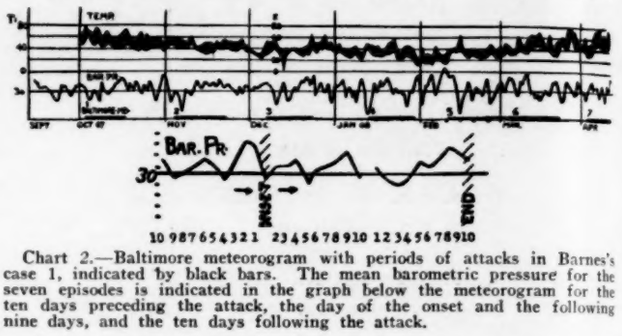

Chart 2.—Baltimore meteorogram with periods of attacks in Barnes's case 1, indicated by black bars. The mean barometric pressure for the seven episodes is indicated in the graph below the meteorogram for the ten days preceding the attack, the day of the onset and the following nine days, and the ten days following the attack.

The seven abrupt psychic changes illustrated in the graph began on Oct. 3, Nov. 4 and Dec. 7, 1907, and on Jan. 13, Feb. 11, March 5 and April 3, 1908.

When studies were made with sufficient frequency, as toward the end of the period, it is noted from Barnes's graph that each episode was associated with an increase in leukocytes and in temperature, pulse rate and respiratory rate, as well as in blood pressure (the last change is observed in characteristic fashion in the fifth and sixth episodes).

A careful examination of the meteorologic temperatures and barometric pressures which have been superimposed above the Barnes graph reveals a rather characteristic meteorologic situation, namely a period of cold and high barometric pressure that existed before the change in the clinical status. The mean barometric pressure for the ten days preceding the attack, for the day of the attack and the following nine days and for the following ten days is shown in chart 2. Here the seven attacks are indicated by black bars below the meteorogram, and the mean barometric pressure is indicated on the graph below.[5]

4. Barnes, F. M., Jr.: A Clinical Study with Blood Examination of Two Atypical Cases Related to the Dementia Praecox Group, Am. J. Insan. **65**: 559, 1909. The cases studied by Barnes are similar to those studied by Gjessing (Beiträge zur Kenntnis der Pathophysiologie des katatonen Stupors, Arch. f. Psychiat. **96**: 319, 1932).

5. Because of the small number of dated attacks here available a statistical analysis is of little value; nevertheless, the probability of such a situation occurring by chance is but 1:10. The usual level of significance taken for discarding a negative hypothesis is 1:20; however, when one considers the nature of the problem, the probability of 1:10 may be sufficiently small to conclude that the movement of the barometer is an important contributing factor in the dating of the attacks.

An increase in barometric pressure of the magnitude here involved indicates that a cold air mass passed over the region and this was in turn followed by the passage of a cyclonic (warm) air mass of more than usual severity. An unusual environmental situation is effective in producing an unusual biologic (and psychic) reaction.

It is this shift that results in the characteristic behavior of the patient—first a period of stimulation and restlessness, followed by stupor. The diversion of biologic phase pendulation we have described as the ARS phase and the COD phase to indicate (1) a period of relative anoxia in the peripheral tissues of the central nervous system and (2) a period of compensation.

After this unusual phase of stimulation and fatigue, a certain amount of time is required for the psychic state to become relatively stable and normal. After this state has been reached the recovery period lasts for a variable time, during which the patient is relatively resistant to environmental swings.

When one compares the shifting moods of the normal young pyknic with those of the leptosome and relates them to the biochemical status of the time and to the weather, it is noted that the leptosome is more apt to become "blue," moody and finally irritable after periods of cold (actual or relative), i. e., the metabolic status is one of lowered p_H, low blood pressure and low blood sugar (COD phase). It corresponds to biologic overstimulation or fatigue.

The pyknic individual is relatively indifferent to this status but becomes buoyant, energetic, restless and ultimately irritable, with periods of increase in p_H, most often associated with the passage of a polar front. At that time an increase in blood pressure and blood sugar and a relatively high potassium calcium ratio exist. The cerebral tissues are functioning under conditions of relative anoxia, demonstrable in the peripheral and pelvic vascular beds.

These associations in the normal person are related to the characteristic psychic manifestations in the schizophrenic and the manic-depressive patient and account for the fact that the schizophrenic (slender!) type is often more activated in the spring (relative spring acidity!) and the manic-depressive (broad!) in the summer and autumn (period of relative alkalinity), as demonstrated in admission records in all state hospitals.

ACUTE EPISODES: WEATHER AND THE MENSTRUAL CYCLE

Barnes's second patient was a woman. In this case one is immediately faced with the biologic phase interference caused by the menstrual cycle,[2a] which, in its various components, may amplify or negate the biochemical swings and incidental reactions induced by the meteorologic situation. As a result, the ultimate biologic and psychic reactions become much more complicated.

A part of Barnes's description of the case follows:

"CASE 2.—No. 547, female, aged 43.

"*Anamnesis.*—One sister died of tubercular meningitis; a paternal uncle was insane, and a maternal aunt has for a number of years been invalided with hysterical paralysis. There was no consanguinity, no history of alcoholic or drug addictions. History of the patient's early life is unimportant; there were no convulsions during childhood or later. She obtained a college education and was a good student. Since about sixteen years of age, at which time her mother died, she has been rather melancholic and of a depressed disposition, more reserved and quiet than formerly. Menstrual function was normal in all respects until 1890, at the age of twenty-five, when she received a severe fall from a horse; since then there has been considerable irregularity in time, associated with pains, headache, etc.

"The first evidence of the present psychosis appeared in 1892, following the prolonged nursing of her sister. She became restless and irritable; at first would take no rest and then became insomnolent; was auto-accusatory (had neglected her sister) and attempted suicide. There were delusions of persecution, and both auditory and visual hallucinations. When she was admitted to this hospital in 1898 it was learned that since 1892 she had repeated attacks at intervals of from two to three weeks and of from two to three weeks' duration. These have all been of a similar nature. More recently they have become more intense and violent, occurring at still more frequent intervals and lasting for shorter periods. Excitement is the most prominent feature during the attacks, when, at its height, she is violent and homicidal. A brief period of depression (apathy and inertia) may either precede or follow the excited phase; in the intervals she seems quite well.

"*Present Condition.*—There has been some change in the course of the attacks, as will be seen from a comparison of her condition in 1902 with that of 1908. Formerly, there was little evidence of the stupor which is now so marked. At the onset, which is sudden, abrupt and unheralded, occurring in the early morning usually, there is wild psychomotor excitement; this after a few days gives way to a mixed state of alternating excitement and stupor, which is, in turn, replaced by a condition of stupor of varying intensity, from which she emerges to her 'normal' state."

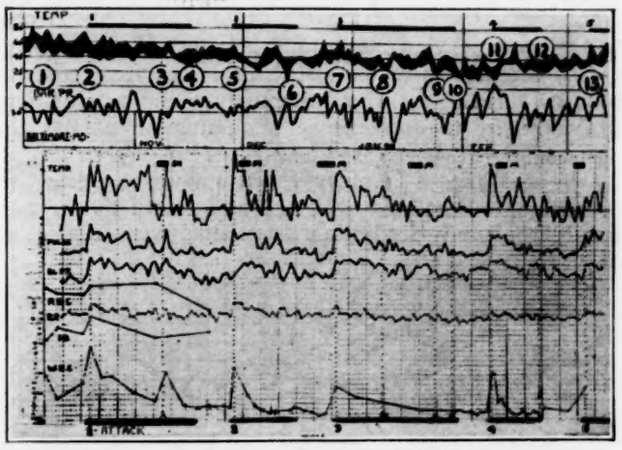

Chart 3.—Barnes's curve for patient 2, studied from Oct. 7, 1907, to March 10, 1908. A meteorogram for Baltimore, showing the daily maximum and minimum temperatures as well as the barometric pressures for this period, is superimposed above the clinical observations. The clinical curves indicate temperature, pulse rate, blood pressure, red cell count, respiratory rate, hemoglobin and white cell count. Periods of attack are indicated by black bars at the bottom and are numbered from 1 to 5. Menstrual periods are represented by the black bars over the patient's temperature curve. Circled numbers indicate the following: (1) end of a period of disturbance; (2) beginning of attack 1; (3) transient quiescence; (4) end of attack; (5) beginning of attack 2; (6) end of attack; (7) beginning of attack 3; (8) (9) and (10) days of quiescence; (11) beginning of attack 4; (12) end of attack, and (13) beginning of attack 5.

It has been seen that the same meteorologic event initiated the onset of the second attack in case 1.

In Barnes's larger graph (chart 3), covering the observation of this patient from October 1907 to March 1908, five distinct periods are represented. An analysis of the blood pressure levels before the attack revealed a situation similar to that in case 1. During period 3 it will be noted that on three days, indicated by 8, 9 and 10, transient remissions occurred; each was distinctly associated with the passing of polar air masses.

When, as in the previous case, one examines the meteorologic association of the onsets of the attacks, one notes that attack 1 began after a period of increased

barometric pressure and falling temperature. Attack 2 occurred with decreasing temperature and rising barometric pressure; attack 3 after a period of increased barometric pressure; attack 4 in association with a barometric crest and falling temperature, and attack 5 with a characteristic polar front of considerable magnitude.

The average barometric pressure for the ten days before the attack, the first ten days after the beginning of the attack and the ten days following the attack again makes evident the fact that a period of cold (increased barometric pressure) was associated with the onset of the episode (chart 4).

When transient interruption of the stupor phase occurs, as at 3 and 8, 9 and 10 in chart 3, one finds either a menstrual period or a period of unusual meteorologic activity, i. e., a sharp polar episode, in temporal relation to the change in psychic status.

No forces in the environment are of greater significance in conditioning the swing in the moods of the normal person and the change in the psychic status of the psychotic patient than those that are grouped under the term "weather."

The air mass in which the individual exists fluctuates from the extremes of the dry, cold, clear polar front to the moist, turbid, warm and relatively light tropical mass. Life in this region of the world requires constant physical adjustment to a continually changing situation presented by the turbulence of circulation of the air masses.

The passage of a polar front initiates a series of physiologic alterations designed to insulate the organism. Incidental thereto is transient blood alkalosis,

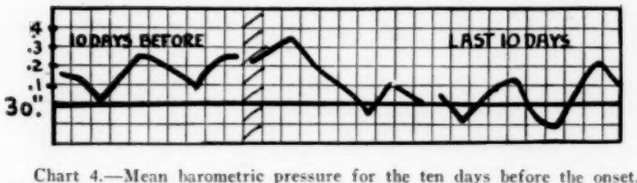

Chart 4.—Mean barometric pressure for the ten days before the onset, the first ten days of the attack and the last ten days of the five episodes recorded in Barnes's case 2. Note the increased barometric pressure associated with the onset of disturbance.

increase in blood pressure and relative tissue anoxia in the peripheral tissues, the cortex of the brain, the pelvic region and, under some circumstances, the myocardium. In the person with a manic-depressive psychosis this biochemical and endocrine reorientation frequently initiates a hypomanic attack.

This reaction is followed by a compensatory period, with relative acidity, a fall in the blood pressure level and low blood sugar and potassium calcium ratio, and generally with an increase in the basal metabolic rate and capillary permeability. In the normal person this period of stimulation may lead to actual biologic fatigue. In the schizophrenic person it is this phase that is most often associated with evidence of restlessness, excitement and abrupt changes in behavior, which are expressed in various ways.

As repeated weather episodes make up the total picture that is termed season, it becomes evident that the schizophrenic patient is more often disturbed during a period in which the general p_H levels are low—a situation occurring most often in the late winter and spring. By contrast, the manic-depressive person finds it more difficult to adjust in periods of relatively high p_H levels, and these are more apt to occur in the summer and autumn.

CONCLUSION

As far as the biochemical rhythm of any individual is conditioned by the environmental situation, both the moods of the normal person and the shifting psychic picture of the psychotic patient reflect, in varying degree, the change in weather, modified, of course, by many other forces, such as the sexual cycle, physical and mental activity, diet, infection, trauma and emotional situation. The effects of weather are most significant because they are relatively prolonged and inescapable, even when the patient is quiet and in bed (though naturally they are then modified), and reveal summation phenomena that are particularly significant in this geographic region, where frequency of change is characteristic and outstanding.

Weather will bring into relief latent hereditary dispositional and constitutional tendencies in the general psychopathic population. Loosely constructed paranoid, delusional effects or vague hallucinatory experiences may become vivid dissociations with schizoid regressions, or emotional instability swings may be augmented into a phasic manic-depressive psychosis.

Meteorologic changes will affect the never static biochemical rhythm, leading to faulty oxidative and metabolic disturbances, which, in their sequence, are mirrored in psychopathologic phenomena.

ABSTRACT OF DISCUSSION

DR. LLOYD H. ZIEGLER, Wauwatosa, Wis.: This paper, correlating abrupt weather changes with exacerbations of psychotic behavior, is interesting. The arthritic are proverbially sensitive to weather changes. The mechanism of this has not been clear. We have all observed that heat, 90 F. and above, together with humidity near the saturation point, is a devitalizing condition inimical to activity and thought. The behavior of some aviators is affected by quick changes in barometric pressures corresponding to altitudes. Caisson disease belongs here too. Some diseases appear to have a seasonal incidence, for example poliomyelitis. Psychoses may obey this law to some extent, but about this much needs to be learned. The migration of birds and the hibernation of certain animals is closely related to changes in the weather. A superb example of the effect of climate in modifying animals is to be seen at the Grand Canyon of the Colorado River. The south rim is about 7,000 feet above sea level. The north rim is about 9,000 feet, and the river and canyon have kept animals that cannot fly apart for countless years. Except for a difference in temperature, the climate of the two rims is essentially the same, and this one difference reflects itself in the animals of the same species by a variation in color, size and other qualities. Their behavior is affected as well as their morphology. One cannot deny that sudden weather changes tend to modify behavior. However, such environmental changes in themselves are not sufficient to account for the genesis of a psychosis. There must be another factor that correlates with the development of a psychosis more than the weather; thus far it has defied research, except that components of it may be exemplified in brain injuries and anomalies of development. Dr. Petersen has made extensive investigations to ascertain the effect of weather changes on disease and biochemical states of various kinds. It is well known that some people are conditioned, in the pavlovian sense, by unpleasant experiences so that the season or the weather at the moment serves thereafter as the stimulus to bring about a recurrence of the feelings associated with the original experience. Weather is one great environmental influence that is common to large groups of people. In time such studies may enable Drs. Petersen and Reese to classify people with regard to some degrees and qualities of sensitiveness, which could well be the earliest indications of a latent psychosis.

DR. IRVING J. SANDS, Brooklyn: The authors have emphasized the influence of the weather and barometric incidences and climateric situations on behavior disorders. They have

vindicated theories which the older clinicians discussed and which led to the coining of the term lunacy—the influence of the moon on human behavior. In the pioneer days of scientific psychiatry, study was limited to observations of a few clinical or pathologic manifestations. Today the human being is regarded as a total personality, as a behavior organism in which every part of his constitution participates in his reaction to situations. All observers now realize the importance of regarding the human being as a whole. We are indebted to the authors for once again directing attention to a most important subject.

DR. HANS H. REESE, Madison, Wis.: It is not easy to correlate all the weather factors which Dr. Ziegler mentioned; they make the picture too complicated. The best way is to consider only the daily mean temperature alterations and the changes in the barometric pressure. These studies support our assumption that the human being is like a cosmic resonator to his surrounding regional meteorologic environment. We postulate that the "feeling" for the barometer is conditioned by rhythmic swings in our constantly fluctuating biochemical milieu, which in the topic under discussion mirrors itself in psychopathologic reactions and psychiatric episodes. The great variability, from simple inadequate feelings and moods to extreme clinical poles of manic-depressive, schizophrenic or paranoid reactions, is related, in our opinion, to inherent genotypic deficiencies in the psychobiology of the individual. A psychic trauma, of whatever origin it may be, upsets the biochemical requisite which is necessary for increased or lessened cellular activity and subsequent functions. The well buffered person with a wide range between the poles of adjustment and of inadequacy is harmoniously integrated, he meets wear and stress situations, psychic trauma and meteorologic bouts well, because his body functions can adjust themselves readily. However, the constitutionally inadequate person with inherent genotypic deficiency will present symptoms depending entirely on the organ selectivity, which cannot make adjustments to abruptly occurring physicochemical changes. The question of adequate and inadequate oxidation in cells and tissues is the important explanation to psychic and psychiatric disorders. This is weather linked, biochemically measurable and clinically obvious. We have analyzed the excellent dated material of R. Gjessing of the University of Oslo and of K. F. Scheid of the University of Munich. We have made graphs of the meteorology of the time for Oslo and Munich, and we could study the interrelation that may be apparent. Gjessing and Scheid's material reveals that the onset of acute episodes in their cases began with a barometric crest and with a period of lowered environmental temperatures. Therefore the weather events could clarify the otherwise obscure occurrence of excitement, stupor and febrile attacks in their cases. Dr. Petersen has pointed out that the onset of psychic or psychiatric episodes coincides with definite changes in the meteorologic environment. Febrile psychotic episodes are clearly related to weather changes. We are not assuming that meteorologic "catastrophes" are the cause of nervous and mental diseases, but we are certain that the "weather" is sufficient to tip a fluctuating unstable predisposed individual into any form of mental illness.

Insect Immigrants Banned.—There are still at large in the world some 20,000 kinds or species of insect pests which have not yet been found in the United States. Many have a great capacity for harm. The federal plant quarantines have halted at our shores thousands of these new crop threats. However harmless an insect is at home, it may be far from harmless in a new environment. For example, natural enemies—parasites and predators—keep the Japanese beetle from being economically important in the Far East. It reached the United States without these natural enemies, however, and found none here to check its multiplication. In the United States the damage by this insect now amounts to nearly if not quite a million dollars a year and it is still spreading. Plant quarantines forbid unconditionally any entry into the United States of certain fruits and vegetables, such as mangoes, yams, avocados, oranges, sweet limes and grapefruit, from certain countries, mainly those to the south.—Clip Sheet, U. S. Department of Agriculture, Oct. 20, 1940.

THE DETERMINATION OF PHYSICAL FITNESS

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Among the many problems that will be given serious consideration in the program of medical preparedness will be that of physical fitness; physical fitness of the soldier to perform military service and physical fitness of the worker to perform useful productive and continuous work. That this matter is of importance can be seen in the recent press report which expressed the concern of the Army Medical Corps about the physical condition of many applicants for army service. At least 30 per cent have been rejected in the New York area because of bad teeth, poor vision, flat feet, bad hearing or "general debility." [1] Such a high percentage of rejections would seem to indicate indeed a low state of physical fitness of the general population or too rigid a set of minimum requirements for acceptance.

Physical fitness has been previously studied in respect to both military and industrial activity. However, it may be desirable to reconsider the problem in view of the present crisis and reexamine some of our past ideas concerning physical fitness because of the newer evidence which seems to dispute the validity of these ideas.

False concepts of capacity to work have had an important influence on our civil, industrial and military life. They have created vague standards of physical fitness that have condemned the physically defective, handicapped by minor disabilities but possessing great potentialities for functional performance. They have been influential in setting an arbitrary industrial age deadline of 40 for the physically useful individual. They have given excessive weight to psychologic and aptitude tests for determining physical fitness, while human energy and capacity have in general been largely underestimated.

These confused ideas play an important role in our national life, since they form the basis of much of our social and labor legislation. The restrictions of hours of work and the restrictions imposed on the labor of women and children are based on presumptions of limitations of physiologic capacity to work. These physiologic criteria are frequently cloaked with social and ethical values so as to identify the violation of or the deviation from the physiologic fact with sin. So, too, the evaluation of permanent disability in workmen's compensation has no scientific foundation but relies on actuarial and legalistic criteria for its determination, even though these methods are employed by physicians. Furthermore, the value of preemployment examinations in the selection of employees and that of the periodic physical examination in the maintenance of physical fitness in the industrial worker will be largely lost if the concept of physical fitness is not clarified in the light of newer information.

DEFINITION

Physical fitness may be defined in several ways. It may be considered subjectively as a state of being, in which case it would be described as normal, healthy, efficient, free from symptoms, free from gross physical defects, ability to withstand physical effort and strain, having the capacity to work. Again it may be defined in terms of its objectives; physically fit for what? Work, play, industry, military service? In a naval

1. United Press report, One Third of New York Applicants "Unfit," New York, Aug. 13, 1940.

military sense physical fitness may be defined as "keeping as many men at as many guns as possible." In its common usage, physical fitness is considered as a combined concept in which both subjective and objective elements play a part. In any case, it is almost automatically identified with three types of states: (1) ideal or superior, (2) normal or average, (3) substandard or inferior. For the most part the basis of this classification is a vague psychosocial concept of the normal person.

CONCEPT OF NORMAL

Physical perfection is recognized as an ideal or superior state, one which few people can achieve. The normal state is one which is free from obvious physical defects. On the latter basis it is virtually impossible to find a completely normal individual. This fact has been determined by physical examinations made in the army and by mass preemployment examinations as well as by studies of school children. In a study that I made of 6,565 male and female workers, only 7 per cent were found to be free from gross defects detectable by physical examinations, 70 per cent had minor defects, 16 per cent had advanced minor defects and 7 per cent had major defects.[2]

Nor does freedom from symptoms constitute a proper basis for defining the normal person. Autopsy reports frequently establish the fact that many individuals who have never suffered any subjective symptoms or physical signs of disease may present evidence of advanced cardiovascular disease, tuberculosis or other serious systemic diseases.

No matter what attempts are made to evaluate standards of physical fitness, social judgments generally complicate the point of view. The term normal, therefore, implies a personal judgment in which we use ourselves as the standard and the subject of our attention as the deviation from that standard. It represents, therefore, a series of physical and psychologic traits, the evaluation of which is influenced by social prejudices and attitudes.

SUBSTANDARD OR PHYSICALLY UNFIT

The presence of physical defects is frequently presumed to imply limitation of capacity to work. This premise may be true in some cases, but it is false in the majority of instances. Even in the presence of a serious physical defect, sufficient function may remain to carry on required industrial activity. Anderson's study [3] of more than 4,000 physically handicapped individuals engaged in 635 different types of work shows the versatility of these individuals as well as the fallacy of thinking that because a man is physically handicapped he is functionally handicapped. The studies of the Western Electric Company [4] covering a group of 685 men and women with physical defects show that the handicapped workers were as fully productive and showed no greater loss of time for sickness, accidents or personal reasons. In a study made by the Swiss National Accident Insurance Fund [5] for the period 1930-1934 95,000 accidents were analyzed for the purpose of determining the influence of age on the frequency and cause of industrial accidents. The highest accident frequency was seen in the age groups 20 to 24 and 25 to 29, the ratio being 216 and 218 respectively per thousand years of life exposure to accident risks. For workers from 40 to 44 the frequency rate dropped to 162 and for those from 45 to 49 to 148 per thousand years' exposure.

In the state of Connecticut [6] more than 8,000 waivers have been signed by those suffering from physical defect of various sorts. The accident frequency rate in this group has been no higher than in the group which signed no waivers.

THE SAFETY FACTOR

The long list of outstanding characters in history, including the fields of literature, art, politics and military and industrial activity, illustrates the point that a disabled person may not only be normally productive but may actually excel in a chosen field.[7] The ability of individuals with physical defects to be as fully productive as so-called normal individuals, that is those free from physical defects, is due largely to the safety factor.

The body can accommodate itself to unusual demands, despite disease or congenital or acquired defects, through physiologic resistance based on factors of safety in its own structure. Through self repair, regeneration, hypertrophy, adaptation to new conditions, vicariousness of function or substitution of one structure for another such as the skin for the kidney, the body is able to combat its environment and fight off harmful influences.[8]

The organic defect may even act as a stimulus to overcompensation of the total personality. Adler [9] developed a complete system of psychology based on this idea of organ inferiority. He stated that we are equipped with materials that are rarely fully developed. Yet with this imperfect development good performances are turned out, just as our ancestors produced great works with imperfect tools. It is probable that a man equipped with defective organs, that is, with inadequate tools, will actually develop a better technic to combat the rigors of his environment. He will pay a great deal of attention to detail, devise more unerring shortcuts or may undergo a more intensive training.

OBJECTIVE CRITERIA OF PHYSICAL FITNESS

Viewed objectively, physical fitness may be regarded as the ability to perform productive and continuous work. The productive capacities of an individual may be said to depend on (1) native ability, (2) training and (3) the presence or absence of illness.

APTITUDE

Native ability or aptitude has been considered the key to the whole problem of physical fitness by educators, employers and personnel men who have devised various tests for the determination of these aptitudes. It is presumed that employees can be selected who will be most productive and least accident and sickness prone by testing them for such traits as concentration, observation, imagination, strength, endurance, speed, dexterity, quick grasp, kinesthetic discrimination, judgment and intelligence. Interest in these tests has been so popular that a bill [10] has been introduced in the United States Senate for the purpose of providing means for the determination of physical fitness and aptitudes. By these tests it is hoped to determine what capacities the individual possesses or to what extent he possesses an unusual trait, talent or ability.

2. Unpublished data.
3. Anderson, R. N.: The Disabled Man and His Vocational Adjustment, New York, Institute for the Crippled and Disabled, 1932.
4. Odencrantz, Louise C.: Experience in the Employment of the Handicapped, Rehabilitation Rev. **6:** 225-237 (Aug.) 1932.
5. Johnson, Ethel M.: Added Compensation Hazards of Older Workers, Swiss Experiences, U. S. Dept. of Labor Bull. 36, Washington, D. C., 1940, p. 107.
6. Personal communication to the author.
7. Wurtz, Hans: Zerbrecht die Krücken, Leipzig, 1932.
8. Meltzer, M.: Factors of Safety in Prostatic Surgery, New York M. J. **110:** 942-944 (Dec. 6) 1918.
9. Adler, Alfred: Understanding Human Nature, New York, Greenberg, Publisher, Inc., 1928.
10. Bill S-4179, for the establishment of a national physical fitness institute in the Federal Security Agency.

CLASSIFICATION OF TESTS

Anatomic.—It would seem foolish to cast horoscopes on the basis of imaginary relations between physical development and capacity to work. Yet anthropologists and anatomists have used the form of the individual as a basis for classifying individuals for work. The relationship between the height when seated to the total stature, termed the thoracic coefficient, and the relationship between the weight and height of an individual, termed the morphologic coefficient, has been suggested by Amar [11] as a guide to the choice of workers fitted for a particular form of labor. Yet he admits that the formation of the body as an index is far from absolute, since adaptation is a factor of greatest importance. He mentions the fencer Kirschoffer, who did wonders despite his small stature. Amar divides individuals into four physical types, namely (1) the digestive type, (2) the muscular type, (3) the respiratory type and (4) the cerebral or nervous type. He implies correlative capacities for muscular and organic effort according to the specific physical type. Griffiths [12] describes twenty-four physical types in their adaptability to work. He details the work requirements for which these physical types may be adapted. Draper [13] and others have also suggested the influence of constitutional physical make-up on the capacity for work. On the other hand, Harris [14] does not agree that a high degree of correlation exists between physical development and physical efficiency. He believes there is no index of physical fitness or efficiency except the ability to do one's job and live to a ripe old age. The establishment of a false index will only produce inferiority complexes.

Physiologic.—From a scientific point of view, the capacity for work may be regarded as a mechanical concept and the human body as a machine capable of expending energy for the execution of certain work. Thus considered the useful mechanical work, the industrial effect, is a quantity which can generally be calculated without difficulty. The work done in ascending a mountain, a staircase or a ladder is the product of the weight of the body and the vertical height ascended. The work of a cyclist is the product of the distance covered and the passive resistance of rolling friction, and so on. The amount done by the arms and legs in operating tools or work done in locomotion can also be measured more or less exactly. However, this mechanical quantity is more difficult to measure when the movements are diverse and complicated because any static effort of the workman escapes the measurements, although the whole muscular activity consists of static efforts.

As a machine, the body is subject to the law of thermodynamics applicable to all machines. Every machine transforms energy. For example, the thermal energy of the coal in the boiler is transformed into electrical energy in the dynamo. In any motor the total expenditure of energy may be divided into the static expenditure needed to overcome the force of friction and the dynamic expenditure which corresponds to the useful work done. In inanimate machines the static expenditure is small compared to the dynamic expenditure, but this is not the case in the animal motor. The latter is always at pressure because if it ceased an instant to be in that state life itself would be arrested. The static expenditure in the human motor is an active and permanent process because it is determined by physiologic needs. This difference between inanimate and animal machines is a factor which has been seriously overlooked by investigators who have interpreted the human body as a machine and who have established certain indexes of its function.

Estimates of physical fitness are frequently based on tests of muscular strength. Police departments use these tests frequently in determining the fitness of applicants for police duty. This factor may be measured by two methods, the ergographic and the dynamometric. In the first, following the classic method of Mosso, the arm or leg is made to perform a piece of work such as rotating a wheel by the hand or pushing a pedal with the leg. The work done is measured according to the mechanical formula the product of the force and the distance from which it is applied. The fallacy of this method is that it depends on fatigue as an index of the amount of work performed. Unfortunately there is no method by which fatigue can be measured. Lee [15] has definitely shown that no test has been devised, be it chemical, physiologic or psychologic, that can measure fatigue.

The use of the spring dynamometer in the determination of physical strength is fraught with error because of the mechanical construction of these appliances. The force of single muscular contractions on deformable springs is used in tests of muscular efficiency. The grip dynamometers of Collins and Smedley are commonly employed. As tested in a large series of cases it was found that the size and shape of the hand, as well as the previous trade and experience, were more important than intrinsic muscular strength in the determination of the results.

The spring balance is a more accurate instrument in determining the muscle strength of individual muscle groups. However, muscular activity is a complicated act and the effectiveness of muscle action depends not only on intrinsic muscular strength but on neuromuscular activity as well. The effectiveness of the blow of a prize fighter will depend on strength plus split second timing and accurate localization of the target. These factors are the result of training. While it is conceivable that, in a single vocation, a job analysis can be made of the muscular strength requirements, it would be almost impossible to include the hundred and one auxiliary muscular acts accompanying specific tasks. Furthermore, these tests omit the important factor of adaptation and training in overcoming primary strength deficiencies.

Tests of cardiovascular efficiency have been frequently used to determine physical fitness. The pulse rate and blood pressure are taken before and after exercise and compared to arbitrary normals. It is assumed from these tests that the results represent the efficiency of the body in its adaptation to work. Schneider,[16] Scott [17] and Crampton [18] have devised indexes of physical efficiency based on these factors. But these formulas are false since they do not evaluate the whole body but select and abstract only a small part of it. Furthermore, they fail to take into account the safety factor, while the

11. Amar, Jules: The Human Motor, New York, E. P. Dutton & Co., 1920.
12. Griffiths, H. Ernest: Injury and Incapacity, New York, William Wood & Co., 1935.
13. Draper, George: Human Constitution, Philadelphia, W. B. Saunders Company, 1924.
14. Harris, H. A.: Anatomical and Physiological Basis of Physical Training, Brit. M. J. **2**: 939 (Nov. 11) 1939.
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16. Schneider, E. C.: A Cardiovascular Rating as a Measure of Physical Fatigue and Efficiency, J. A. M. A. **74**: 1507-1510 (May 29) 1920.
17. Scott, Verner T.: The Application of Certain Physical Efficiency Tests, J. A. M. A. **76**: 705-707 (March 12) 1921.
18. Crampton, C. W.: Blood Ptosis: A Test of Vasomotor Efficiency, New York M. J. **98**: 916, 1913.

entire hypothesis underlying their use is based on the fallacious concept of man as a machine.

Spirometry has been used to determine pulmonary and cardiac efficiency.[19] These vital capacity tests are also frequently employed in physical examinations in industry. In one lead plant, one of the main requirements for passing the physical fitness test on the part of applicants was a high vital capacity reading. It was assumed that such an individual would have a strong constitution and a strong resistance toward the development of lead poisoning. Nevertheless the incidence of lead poisoning was higher in the group with the high vital capacity reading, since the volume of inspired lead-containing dust was much greater in this group than in those with a lower vital capacity.

Psychologic. — Psychologic aptitude tests have received considerable attention in the measurement of intelligence and especially in the field of vocational guidance.[20] They have assumed such a popular acceptance transcending their real value that it has been difficult to avoid the accusation of phrenology, clairvoyance and fortune telling leveled at those engaged in this field.

There are many fallacies underlying their use: (1) the mechanical concept underlying these tests, namely, comparing the body to a machine; (2) the selection of comparatively few traits out of many thousands to represent the total physical and mental personality of the individual; (3) the difficulty in separating native ability from training, so that what is really being measured is a compound of the two; finally, and most important, (4) the assumption that there are great differences between individuals.

But do men really differ so enormously from one another as to place such great reliance on these tests? Do these differences, if they exist, obtain for the entire span of human capacities or are they encountered only in such special fields as, for example, those of mathematical or artistic ability or ability to pilot a plane? How much more productive is the most efficient individual than the least efficient in a given occupation?

Range of Human Capacities.—Many of the answers to these interrogatories have been provided by a study of the range of human capacities made by Wechsler.[21] In this study are included the bulk of available data up to 1933, comprising studies of linear traits, body circumference, metabolic rates, physiologic functions, motor functions, and perceptual and intellectual abilities. Wechsler has shown that for the same age group there are little differences in human capacities. He has furthermore demonstrated that the total range ratio between the least productive and the most productive individual, as revealed by the existing available data, is not greater than 2 to 1. For example, in an industrial plant where disks were being strung this ratio was 2.12 to 1. In another operation, namely the speed of inserting bolts, the ratio was 2.09 to 1. In still another operation, that of card sorting, the ratio was 2.50 to 1. In the high jump the ratio was 2.01 to 1. In the broad jump the ratio was 2.07 to 1. In the upper limit of audibility the ratio was 2.09 to 1. These differences in performance are indeed small and are especially significant if it is remembered that they are a compound of native inherent ability and training.

19. Ornstein, George C., and Epstein, I. G.: Spirometry as a Procedure of Determining Pulmonary Efficiency in Pulmonary and Heart Disease, J. M. Soc. New Jersey **37**: 401-410 (Aug.) 1940.
20. Spearman, C. E.: The Abilities of Man, New York, Macmillan Company, 1927.
21. Wechsler, David: The Range of Human Capacities, Baltimore, William Wood & Co., 1935.

TRAINING

Productivity depends not only on native ability but also on training. Much of the capacity which is being measured represents acquired knowledge, experience or actual instruction in general or special skills. While these may be measured, it must be understood that equal opportunity exists for the development of capacity to work based on training.

ILLNESS

I have already said that minor physical defects do not influence productivity. I am, of course, referring to static defects, as short stature, underweight, a stiff elbow, amputation of a finger or leg, leg shortening, or paralysis of a hand. Accommodation to these static defects may be sufficiently adequate to make the individual fully productive. The leg amputee can perform seated or standing work. Paralysis of an arm may still permit the individual to work as a draftsman or as a salesman.

Illness, however, is dynamic and not static. Tuberculosis, syphilis, arthritis or any infectious or degenerative systemic disease will affect productivity by influencing perceptual intellectual and motor functions. The detection of these illness states by complete and thorough physical examination is of definite and constructive value.

CONTINUITY OF WORK

Physical fitness depends not only on the capacity to be productive but also on the assumption that this productivity is not interrupted. Continuity is disturbed by loss of time. Absenteeism is important economically to industry and also to military service.

Loss of time is incurred because of so-called personal reasons, accident and illness. There is no way of protecting against loss of time because of personal reasons. Studies of accident proneness by the Industrial Fatigue Research Board have produced only equivocal results.[22] Lanza and Vane [23] support the observation that sickness prone individuals exist. Although they constitute a small percentage of total employees they account for an inordinately large number of lost days due to illness. Lanza and Vane report that rigid standards of preemployment physical examination are not the solution, since even in such highly selected groups as the military service noticeable degrees of absenteeism are encountered. There is, however, a high degree of correlation between sick absenteeism and the presence of serious organic illness or profound emotional instability. Hence complete and thorough physical examination will materially help to reduce lost time from these causes.

SUMMARY

Physical fitness is a socio-economic concept involving the social evaluation of a series of anthropologic, physiologic and psychologic traits. It becomes a medical concept in the presence of physical defect. Here the physician also derives a social judgment (ability to work) out of pathology. Pathology determines the nature of the illness or defect but not the extent of the remaining health or the extent of adaptation of the remaining functions. A person lives not only with his pathologic lesion but also with the remaining undisturbed organs and functions.

Physical fitness in its widest sense is the ability to perform productive and continuous work. This fitness is based on native ability, training and the presence or

22. Vernon, H. M.: Health in Relation to Occupation, New York and London, Oxford University Press, 1939.
23. Lanza, A. J., and Vane, R. J.: Absenteeism in Industry, Bull. 4, Medical Series, Air Hygiene Foundation, Pittsburgh.

absence of illness. The determination of these factors by physical examination is of limited value except as it may detect gross illness states or profound emotional instability, which are liable to influence productivity and continuity of industrial and military service. Static defects should be separated from illness states and their limited effect on working capacity properly evaluated. Rejection should be based on the presence of organic disease and not on static defects, except where job analysis in a specific vocation indicates unusual physical requirements. The popular notion that wide variations in individual capacities to work exist should be reconsidered in the light of Wechsler's data. Finally, in the determination of physical fitness by means of the physical examination, the physician should bear in mind that the average man can do the average job.

53 Lincoln Park.

THE EFFECTS OF REPEATED ANOXIA ON THE BRAIN

A HISTOPATHOLOGIC STUDY

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The effect of oxygen deprivation on the nervous system, and particularly the brain, has become a problem of great practical significance in recent years. The rapid progress of aeronautical engineering with the production of planes with high ceilings and rapid rates of climb has brought many of these problems to the fore. Another situation, only numerically less important, exists in the industrial and physiologic laboratory in which experimenters subject themselves repeatedly to conditions of oxygen lack. These two examples of repeated anoxia stimulated the initiation of the work reported here, in which an attempt was made to determine in guinea pigs and cats the nature and extent of the histopathologic changes which may occur in the brain after a single and after repeated periods of pure anoxia.

In order to function properly, the nervous system must have an adequate oxygen supply. There are several avenues open to explain this fact, and it is probable that no one approach alone is entirely adequate. One of these avenues is a consideration of the effects of oxygen lack on isolated parts of the nervous system. The effects of anoxia on small units of the nervous system have become known but recently. Lehmann [1] has shown that an excised nerve (which consists of the elongated processes of nerve cells) when deprived of its oxygen supply by immersion in an atmosphere of pure nitrogen demonstrates a typical sequence of irritability changes. This consists of an initial lowering of the threshold of excitability, followed by progressive failure of irritability of the nerve fibers. If the oxygen deprivation does not exceed certain time limitations, the nerve may be restored to its former functional state by allowing it access to oxygen. A similar succession of events in a natural situation was noted by Thorner and Brink [2] when the human ulnar nerve was deprived of its circulation, which created, among other consequences, an anoxic state for a period not exceeding thirty minutes. The change in the functional state of the nerve, shown by the changes in threshold excitability, is reversible when the circulation has been restored. The synaptic junction of neurons is also deeply affected by oxygen deprivation. Bronk, Larrabee and Gaylor [3] have shown that cutting off the oxygen supply to the stellate ganglion of the cat causes a progressive failure of the ability of the synaptic structures to transmit impulses. This effect too is reversible if the period of anoxia has not been too prolonged.

Similar functional changes have been observed in the central nervous system, as the spinal cord [4] and brain. In these cases, either excitability or conductivity, or both, is taken as an index of the functional state. Gerard,[5] in a study of anoxia and neural metabolism, suggested that one of the functions of oxygen is to keep the cell membrane polarized and that complete anoxia initiates proteolytic processes in neurons. This reaction may occur partly as a result of accumulation of lactic acid in the anoxic state. Gellhorn [6] believes that anoxia and hypoglycemia are very much alike in their physiologic effects as they act synergistically in the production of convulsive seizures.

A second avenue of approach to the problem of anoxia and the nervous system is the observation of the partial or total behavior of man and the intact or specially prepared experimental animal during oxygen lack. McFarland [7] has made extensive psychologic studies into the general behavior of individuals breathing air in which the oxygen partial pressure has been reduced. Another opportunity in this type of study is provided by the present trend in the shock therapy treatment of schizophrenia by short periods of oxygen deprivation.[8] Bentley [9] approached the problem similarly. McFarland and others [10] have confined their observations to changed reactions in circumscribed parts of the central nervous system, such as the central visual fields during anoxia and the ocular movements while reading. Jokl [11] has reported changes in the tendon reflexes during periods of anoxia. Most of these observations are concerned with the functional changes occurring during the anoxic period. Relatively little work aside from the observation of shock treated schizophrenic patients has been done with reference to the possibility of residual changes in the function of the nervous system as a whole after periods of anoxia. For the practical reasons cited in the opening paragraph, this is obviously worth investigation.

A third avenue of approach is the gross and histopathologic examination of the nervous system which

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1. Lehmann, J. E.: The Effect of Asphyxia on Mammalian A Nerve Fibers, Am. J. Physiol. **119:** 111 (May) 1937.
2. Thorner, M. W., and Brink, F.: Unpublished data.
3. Bronk, D. W.: Larrabee, M. G., and Gaylor, E.: Personal communication to the authors.
4. Tureen, L. L.: Circulation of the Spinal Cord and the Effect of Vascular Occlusion, A. Research Nerv. & Ment. Dis., Proc. (1937) **18:** 394, 1938.
5. Gerard, R. W.: Anoxia and Neural Metabolism, Arch. Neurol. & Psychiat. **40:** 985 (Nov.) 1938.
6. Gellhorn, Ernst: Effects of Hypoglycemia and Anoxia on the Central Nervous System, Arch. Neurol. & Psychiat. **40:** 125 (July) 1938.
7. McFarland, R. A.: The Psychological Effects of Oxygen Deprivation on Human Behavior, Arch. Psychol., 1932, No. 145, p. 135.
8. Himwich, H. E.; Alexander, F. A. D., and Lipetz, Basile: The Effect of Acute Anoxia Produced by Breathing Nitrogen on the Course of Schizophrenia, Proc. Soc. Exper. Biol. & Med. **39:** 367 (Nov.) 1938.
9. Bentley, M.: Oxygen Tension and the "Higher Mental Processes," Am. J. Psychol. **52:** 72 (Jan.) 1939.
10. Evans, J. N., and McFarland, R. A.: The Effects of Oxygen Deprivation on the Central Visual Field, Am. J. Ophth. **21:** 968 (Sept.) 1938. McFarland, R. A.; Knehr, C. A., and Berens, Conrad: The Effects of Oxygen Deprivation on Eye Movements in Reading, J. Exper. Psychol. **21:** 1 (July) 1937; The Effects of Anoxemia on Ocular Movements While Reading, Am. J. Ophth. **20:** 1204 (Dec.) 1937.
11. Jokl, E.: Medical Problems of Aviation, J. Roy. M. Corps **73:** 289 (Nov.) 1939.

has experienced anoxia either alone or in combination with other factors. These morphologic studies yield evidence of structural change which, by inference, may be associated with functional change. It remains entirely possible that many sorts of functional disabilities may occur in which our present arbitrary methods of histopathologic technic may yield no valid information. The pathologic effects of cerebral anemia (which introduces other factors as well as reduction in oxygen supply) have been studied by Gildea and Cobb.[12] These authors found nonspecific cortical lesions such as focal areas of necrosis and both swollen and shrunken ganglion cells. The appearance of focal areas of true necrosis may require a lapse of twenty-four hours after an anemic period, but degenerative changes in the ganglion cells may occur almost immediately. The large and small ganglion cells were most sensitive. More recently Weinberger and the Gibbons [13] produced a temporary period of anemia by occlusion of the pulmonary artery. They found permanent severe pathologic changes in the cerebral cortex of the cat after an anemic period of three minutes and ten seconds, while longer periods of occlusion of the pulmonary artery produced, in addition, lesions in the Purkinje cells of the cerebellum and in the nerve cells of the basal ganglions. Studies on animals whose circulation is decreased introduce factors other than anoxia, and there is no evidence that the changes so produced may be due entirely to anoxia rather than to the concomitant factors in anemia. Some of these factors have been indicated by Sugar and Gerard.[14] In this group belong hypoglycemia, hypercapnia and disturbances of intracellular and extracellular ionic balance.

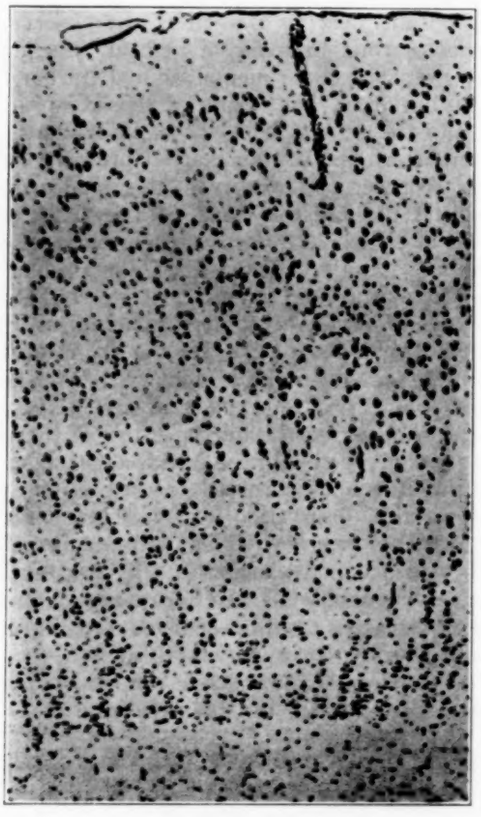

Fig. 1.—Section of brain cortex of guinea pig 9 immersed for fifteen seconds in nitrogen and decapitated thirty minutes later. This is a normal cortex showing normal architecture and well stained cells. (Cresyl violet stain; reduced from a photomicrograph with a magnification of 130 diameters.)

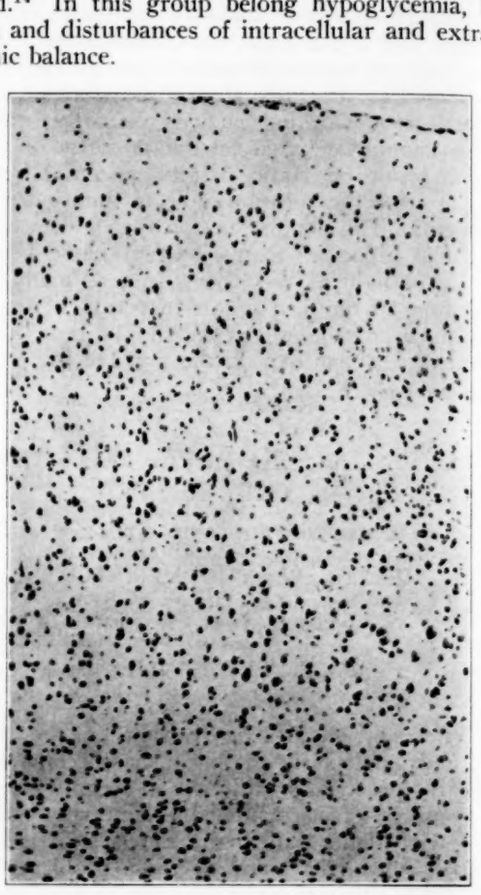

Fig. 2.—Section of brain cortex of guinea pig 10 immersed for thirty seconds in nitrogen and decapitated thirty minutes later. The nerve cells are insufficiently stained, the glia nuclei pyknotic. However, the damage is of metabolic rather than of structural nature, because silver impregnated slides show that the number of nerve cells is not visibly decreased. (Cresyl violet stain; reduced from a photomicrograph with a magnification of 130 diameters.)

Mechanical stoppage of the circulation to produce anemia has been supplanted by other methods. Crile and Dolley [15] used pharmacologic methods to effect cardiac stoppage and resuscitation, while Batelli [16] produced the same effects with electrical currents. The pathologic changes of the brain have been studied after various pharmacologic insults the main effects of which have been attributed to anoxia. Fatal cases of nitrous oxide-oxygen anesthesia have been described by Löwenberg, Waggoner and Zbinden,[17] as well as by Courville.[18]

In these cases too in which death sometimes followed narcosis immediately, lesions of the cortex and basal ganglions predominate. These authors believe that anoxia is responsible for the changes observed. Carbon monoxide poisonings are of interest in this connection as they deprive the blood of its oxygen carrying capacity. Here again it may be questioned whether the

12. Gildea, E. F., and Cobb, Stanley: The Effects of Anemia on the Cerebral Cortex of the Cat, Arch. Neurol. & Psychiat. **23:** 876 (May) 1930.

13. Weinberger, L. M.; Gibbon, M. H., and Gibbon, J. H., Jr.: Temporary Arrest of the Circulation to the Central Nervous System, Arch. Neurol. & Psychiat. **43:** 615 (April), 961 (May) 1940.

14. Sugar, O., and Gerard, R. W.: Anoxia and Brain Potentials, J. Neurophysiol. **1:** 558 (Nov.) 1938.

15. Crile, George, and Dolley, D. H.: On the Effect of Complete Anemia on the Central Nervous System in Dogs Resuscitated After Relative Death, J. Exper. Med. **10:** 783, 1908.

16. Batelli, F.: Le rétablissement des fonctions du cœur et du système nerveux central après l'anémie totale, J. de physiol. et de path. gén. **2:** 443, 1900.

17. Löwenberg, Konstantin; Waggoner, R. W., and Zbinden, Theodore: Destruction of the Cerebral Cortex Following Nitrous Oxide-Oxygen Anesthesia, Ann. Surg. **104:** 801 (Nov.) 1936.

18. Courville, C. B.: The Pathogenesis of Necrosis of the Cerebral Gray Matter Following Nitrous Oxide Anesthesia, Ann. Surg. **107:** 371 (March) 1938.

cerebral changes in carbon monoxide intoxication are not caused in part at least by factors other than anoxia. In brief, we have found no record of investigations testing the influence of pure anoxia on morphologic changes in brain structures.

METHOD AND DATA

In order to study the effectiveness of anoxia without the introduction of complicating factors, it was decided to utilize the simple expedient of placing the experimental animals in an environment of practically pure nitrogen for various periods of time. The animals used were guinea pigs and cats. These were placed individually in containers with a glass top for observation. The containers could be flushed with a constant stream of nitrogen from a pressure tank. At the end of the period of immersion the animals could be removed and placed in the air. Since many of the animals became apneic during their immersion in nitrogen, artificial respiration had frequently to be used. It is a fortuitous fact that the heart beat continues and usually increases in rate both during these immersions and for minutes after an animal has become apneic. Because of the functional integrity of the circulation during these experiments, it may be stated that there is no significant factor other than anoxia introduced in these experiments. Of the changes observed, many may be the result of factors which are secondary effects of anoxia, but the data apparently validly indicate the relation between structural brain damage and anoxia of the total animal. For this reason the results may not correspond to a synthetic picture derived from the study of isolated parts of the nervous system in anoxia when these secondary effects are excluded.

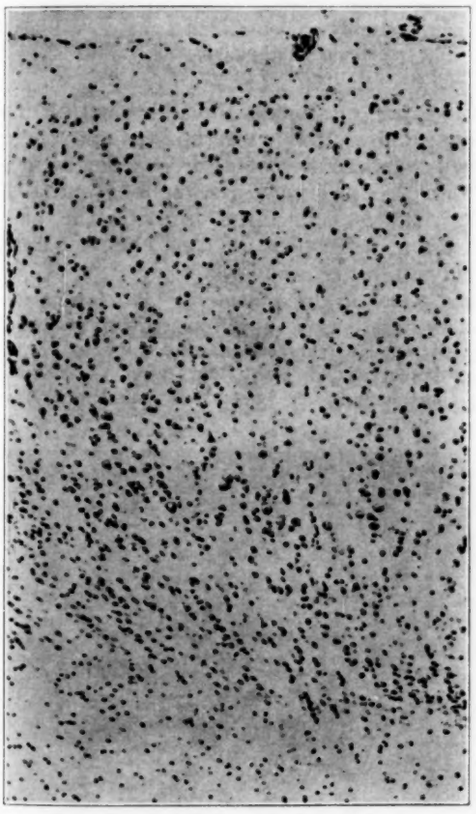

Fig. 3.—Section of brain cortex of guinea pig 11 immersed for sixty seconds in nitrogen and decapitated thirty minutes later. More extensive and intensive damage of the same type as in figure 2. Some large nerve cells in the deeper cortical layers are swollen, the nucleus is retracted and the cytoplasm is almost or completely unstained. The appearance of some nerve cells suggests permanent damage. (Cresyl violet stain; reduced from a photomicrograph with a magnification of 130 diameters.)

Guinea pigs immersed in an atmosphere of nitrogen behave in a somewhat stereotyped manner. There is usually an almost immediate increase in the respiratory rate. In from ten to fifteen seconds the animal becomes very active. In another twenty seconds the animal shows some arching of the neck and then slumps to the floor of the container. The retinal light reflex, ear, tongue and mucous membranes appear cyanotic. Spasmodic movements may be seen, varying from isolated clonic twitching to generalized convulsions. If the animal is immersed for more than one minute, it is usually apneic when removed and must be given artificial respiration. The majority of pigs immersed in nitrogen for 105 seconds cannot be revived. In no case did the heart beat cease before respiratory failure.

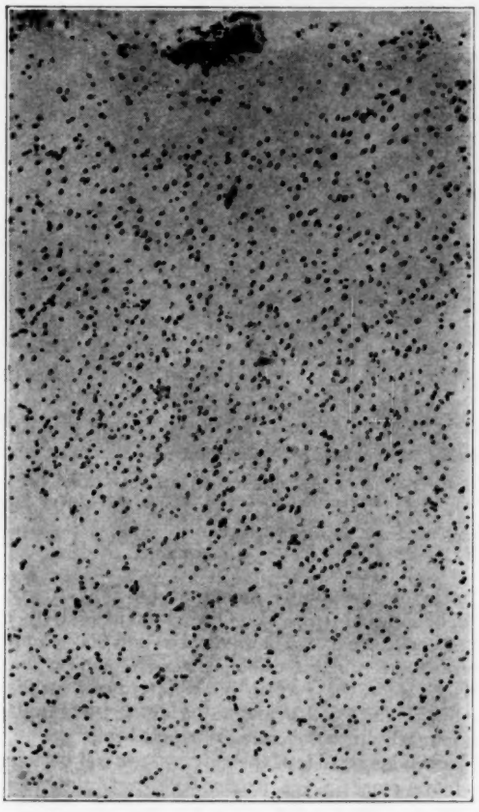

Fig. 4.—Section of brain cortex of guinea pig 5 immersed twenty-four times in nitrogen. The animal died forty-eight hours after the last immersion. The difference between this cortex and that represented in figure 1 is striking. Although here is true what has been said in reference to figure 2, namely that many more cells are present than are stained with basic dyestuffs, a marked number of nerve cells are permanently damaged. Subpial hemorrhage. (Cresyl violet stain; reduced from a photomicrograph with a magnification of 130 diameters.)

Cats immersed in nitrogen can be observed to exhibit the same symptoms, except that the time scale is longer.

The time required for recovery from anoxia varies with the length of the anoxic period and may extend over some hours in cats. In some animals death occurred directly from prolonged anoxia; in others death occurred many hours after seeming recovery from an anoxic period. A last group of animals was killed by decapitation after one or more anoxic periods. Many animals underwent repeated periods of anoxia. None of the animals developed unusual behavior or showed neurologic signs as a residuum. Complete gross and microscopic studies of the brain were made on all animals.

In general, the animals may fall into five groups:

GROUP 1.—*Animals rendered anoxic for various periods of time and decapitated within one-half hour of removal from the chamber.*

Animals (9, 10 and 11) kept for fifteen, thirty and sixty seconds, respectively, in nitrogen and decapitated thirty minutes later. The three animals were litter mates and albinos.

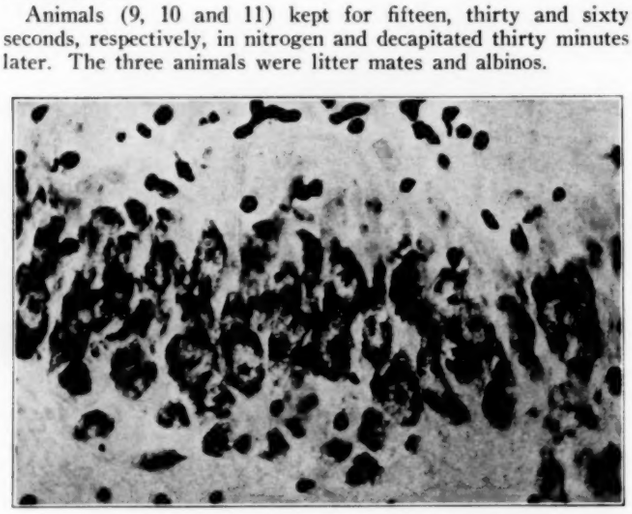

Fig. 5.—Section of fascia dentata of Ammon's horn of the animal decapitated after having been immersed in nitrogen for fifteen seconds, showing normal architecture and appearance of cells. (Cresyl violet stain; reduced from a photomicrograph with a magnification of 550 diameters.)

The brain of the animal immersed for only fifteen seconds seems to be normal (fig. 1). One is impressed by the great number of cortical nerve cells and their well stained appearance. There are some congested blood vessels and a few miliary hemorrhages over the cortex, but this plays a negligible role compared with the good preservation of cortex, Ammon's horn (fig. 5), cerebellum, basal ganglions and brain stem.

With longer immersion of the animals, the cell changes become slightly more marked, are patchy in distribution (fig. 2) and become more diffuse after sixty seconds of anoxia (fig. 3). Fresh perivascular hemorrhages are more frequent, and in the white matter perivascular areas of coagulation appear. The blood vessel wall is more darkly stained in some of them and not stained in others. In general there seems to be a tendency to increasing severity of tissue damage with prolonged time of immersion. However, the degree of damage cannot be judged from cresyl violet stained sections. Silver impregnation and hematoxylin show that the cell damage is of a chemical rather than of a structural nature. Many more cells are still in existence than take basic dyestuffs, though there is no doubt that some cells are permanently damaged with anoxia of sixty seconds' duration.

Conclusion.—Anoxia of fifteen seconds' duration does not produce visible damage to brain cells. Anoxia of thirty seconds' duration is followed by metabolic changes and anoxia of sixty seconds' also by morphologic changes in the cortical nerve cells. In the last group, in addition, subpial and intracerebral perivascular hemorrhages and coagulation were found.

These observations indicate that sublethal periods of oxygen deprivation produce damage to cortical cells, which becomes readily apparent if the animals are permitted to survive for one-half hour. The time of immersion in oxygen necessary to produce such changes is between fifteen and thirty seconds. Almost certainly many of these changes are reversible. In addition to the degenerative changes in cortical cells there are congestive and hemorrhagic blood vessel phenomena which appear even in the animal which was immersed in nitrogen for fifteen seconds. Presumably sufficient damage to the smaller units of the vascular tree may affect cerebral neurons as a secondary factor.

GROUP 2.—*Animals killed in nitrogen directly with no recovery period.*

One guinea pig (1) and one cat (7) killed in nitrogen directly.

These animals show subpial hemorrhages and some vague nerve cell changes. The cortical architecture is normal, as are Ammon's horn, Purkinje cells, ependyma and blood vessels.

Conclusion.—The brain of animals killed directly in nitrogen is almost normal aside from subpial hemorrhages.

In contrast to the animals of group 1, in which the animals were permitted a short survival period, the circulatory and degenerative changes observed in group 2 are relatively slight. The actual damage to cerebral tissue in animals killed by anoxia should certainly be greater than in those subjected to sublethal anoxia, but it appears that a survival period is necessary for the change to become histopathologically apparent.

GROUP 3.—*Animals killed in nitrogen following repeated sublethal exposures at different days.*

One guinea pig (2) was killed in nitrogen after nine periods of anoxia, another (6) after twelve periods.

These animals showed a great number of subpial hemorrhages over the convexity and base of the brain. The pia was slightly thickened and contained an increased number of fibroblasts. The type of nerve cell changes was the same as in group 1 but the degree of the disease was more severe. The nerve cells of the deep cortical layers of Ammon's horn and the subiculum were pale, their nuclei shrunken and pyknotic, the cytoplasm of foamy appearance. Foci of blanching were present in the cortex, possibly in connection with fibrosis of the small arteries. In larger arteries the media was rich in fibroblasts and incrustated with a granular material giving the reactions of calcium.

Conclusion.—With repeated periods of anoxia the nerve cells become more severely damaged, and some cells disappear completely. The meninges and blood vessel walls show signs of fibrosis and incrustation.

In this group of animals the additional picture of the permanent damage following repeated anoxic exposures was seen. Apparently some of the changes seen in the animals in group 1 were irreversible, and these irreversible changes sum up to provide the pictures of extensive and permanent damage when the animals are repeatedly subjected to anoxia.

GROUP 4.—*Animals dying hours after nitrogen immersion.*

Animals dying spontaneously from eight to forty-eight hours after one or repeated immersions into nitrogen (12, ten hours after one immersion; 3, eight hours after twelve immersions; 5, forty-eight hours after twenty-four immersions at different days).

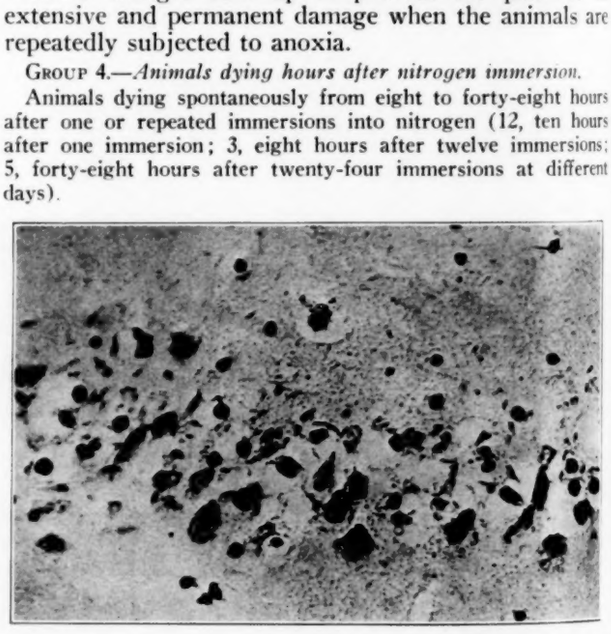

Fig. 6.—Section of fascia dentata of Ammon's horn of the animal that died forty-eight hours after the last of twenty-four exposures to nitrogen, showing ischemic cell necrosis. (Cresyl violet stain; reduced from a photomicrograph with a magnification of 550 diameters.)

The cortex of these animals was markedly damaged. The nerve cells showed a small pyknotic nucleus retracted from the cytoplasm, of which only a marginal zone was stained with basic dyestuffs. The cortex seemed to be devoid of ganglion cells (fig. 4). However, here again silver and hematoxylin stained sections indicated that more nerve cells were present than were visible in the cresyl violet stained preparations.

This is a condition well known, for instance, from the encephalopathy following whooping cough and has to be considered, as already mentioned, as a chemical rather than a structural damage.

The nerve cell changes were most pronounced in the granular layers of the cortex, while both the Ammon's horn (fig. 6) and the Purkinje cells showed the typical picture of advanced ischemic disease. There was a mild proliferation of the ependymal cells and in one animal (12) a localized, mild meningitis with lymphocytic infiltration.

In one animal of this group the nerve cells of the basal ganglions and brain stem were involved in contrast to all other animals of this investigation.

Conclusion.—The animals of this group, although exposed for about the same period of time to nitrogen as those of group 3, were microscopically more severely damaged. This could be suspected from the fact that these animals died spontaneously. More cells were structurally and permanently damaged than in the former group, as exemplified by the almost necrotic condition of the Ammon's horn cells.

This group of animals represents a peculiar situation in which the animals are able to survive immediate periods of anoxia but die hours later. These animals were studied by a thorough general autopsy, and no significant extraneural lesions were found. While this situation generally occurred following the last of several periods of anoxia, one animal had only one exposure.

GROUP 5.—*Animals decapitated after repeated anoxia.*

Animals decapitated after seven and twenty-nine anoxic periods, respectively (cat 8 and guinea pig 4).

The changes in the cortex of these animals corresponded closely to those of group 4, indicating that the form of death has no influence on the type or degree of cell disease. In this group the granular layers were again greatly involved, in some convolutions more the outer, in others more the inner granular layer. While the cell degeneration was laminar in the guinea pig, it was patchy in the cat. This cat was the only animal that showed at least a suggestion of glial reaction.

The degree of nerve cell damage in the guinea pig which underwent twenty-nine periods of anoxia does not correspond to the frequency of anoxia. As far as can be concluded from the small number of animals, increased nerve cell damage runs parallel to the increased frequency of anoxic periods up to a certain point beyond which cell loss does not progress further. The Purkinje and Ammon's horn cells were ischemic approximately to the same degree as in group 4. The meninges and blood vessels showed mild fibrosis. The number of subpial and perivascular hemorrhages was not markedly increased, compared with those found in group 4.

Conclusion.—Decapitation after repeated periods of anoxia gives essentially the same picture as that seen in animals which die spontaneously after repeated periods of anoxia. The cell damage is laminar in the guinea pig and patchy in the cat. The cat is the only animal showing a suggestion of glia reaction, whereas the glia in all other animals seems to be damaged, together with the nerve cells. Cortical cell damage seems to progress with increased frequency of anoxia only to a certain point and then to lag.

COMMENT

Anoxia acts on ectodermal and mesodermal tissue alike in the brain of the guinea pig and of the cat. This action becomes visible first after immersion of the animal in nitrogen for one-half minute and is more marked after one minute. These initial changes are mainly of metabolic nature, the cell chemistry being so altered that the cytoplasm becomes unable to take basic stains such as cresyl violet. It is likely that most of these changes are reversible. This is not so with the perivascular hemorrhages and coagulations, which necessarily destroy minute portions of brain tissue. Hemorrhages indicate, in addition, a lesion of the wall of the blood vessel as demonstrated by its increasing fibrosis and incrustation. Hence a secondary noxious factor appears after several periods of anoxia, namely the decreasing permeability of the wall of the blood vessel.

Integration of these two factors leads, after a greater number of anoxic insults, to structural and apparently permanent lesions in the cortical cells. The distribution of the cell lesions is irregular, in some animals more laminar and more pronounced in the granular layers, in others patchy and more marked in the pyramidal layers.

In all animals but one the glia appeared to participate in the suffocation and did not show any sign of proliferation.

The impression prevails that with increasing frequency of anoxia the alteration in the central nervous system rapidly reaches a maximum which seems not to be surpassed even in animals so severely hit that they die spontaneously some time after the last immersion.

It must be taken into consideration that the histologic picture conveys but a vague idea of the function of a cell. Even the complete disappearance of a number of cells gives no indication as to whether the available reserve of nerve cells is still able to maintain normal function or as to when they too will be exhausted. Be this as it may, one point stands out, and that is that metabolic changes are very early demonstrable in brain cells of anoxic animals and that with repeated attacks of severe anoxia more and more nerve cells perish.

In the majority of the animals here presented there is much evidence to suggest that repeated and short periods of anoxia may produce a summated picture of considerable permanent damage to the brain. However, the experimental procedure used (complete anoxia) would rarely be encountered in man, either in aviation, industrial or laboratory activities. Yet it would seem reasonable to believe that these degenerative and vascular changes may also occur when anoxia is only partial. Van der Molen [19] states that at oxygen partial pressures slightly less than half that at sea level, and equivalent to that at an altitude of about 28,000 feet, cortical cell changes occur. Presumably, some of these changes may become permanent and the result of repeated exposures of this type may decrease the ability of the brain to operate efficiently and compensate adequately for the destroyed tissue. An interesting fact in this connection is the common observation among aviators, stressed by Armstrong,[20] that, as their air experience becomes longer, their ability to fly at high altitudes becomes less. Whether this is a function of increasing age or is due to repeated exposures to low oxygen environments is not clear.

The negative result of repeated sublethal experimental exposures of guinea pigs and cats to anoxia, as far as function is concerned, is in accordance with experience in man. This does not mean that there are no functional disturbances but that our present methods of examining men and animals are not appropriate to demonstrate their presence. In fact, it is likely that the application of modern sensitive neurophysiologic and psychologic methods would show deviations from the normal.

Yet the present experiments indicate that exposure to anoxia of increasing duration or repetition is followed by graded severity of damage to the nerve cells in brain and brain stem. Even one single period of

19. van der Molen, H. R.: Question of Sequels of Narcosis or of Asphyxia: Experimental Studies on Effect of Oxygen Withdrawal on Central Nervous System, Nederl. tijdschr. v. geneesk. **83**: 4921 (Oct. 14) 1939.

20. Armstrong, H. G.: Anoxia in Aviation, J. Aviation Med. **9**: 84 (June) 1938.

anoxia of sixty seconds' duration leaves distinct traces of morphologic changes behind. There is no way of stating whether these damaged cells can recover. But the gradual increase of permanently damaged nerve cells and changes in the blood vessel walls, as well as in the meninges, points to the likelihood that no prolonged periods of significant oxygen lack leave the brain totally unscathed. The great reserve of nerve cells in the brain is probably responsible for the fact that functional compensation is possible for a certain time. However, this consideration should not allow one to overlook the organic sequelae of repeated though individually short lasting periods of anoxia, which, when summed up, may eventually lead to mental conditions comparable to those of the "punch-drunk" boxer.

SUMMARY

Exposures to sublethal periods of pure anoxia lead to vascular and degenerative changes in the brains of guinea pigs and cats. Some of these changes are irreversible and become summated in animals repeatedly subjected to anoxia. Because of quantitative differences in the extent of anoxia and the differences in species, these experiments cannot be translated directly to situations of oxygen deficit in man. Yet as demonstrating a general process these experimental results point to the possibility of a gradual lowering of the cerebral reserve in individuals repeatedly exposed to low oxygen environments.

THE EFFECT OF ALCOHOL ON DRIVING SKILL

HENRY NEWMAN, M.D.
AND
EDWIN FLETCHER
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One important step toward the solution of the problem of drunken driving lies in the accurate diagnosis of drunkenness. That a definite correlation between blood alcohol concentration and intoxication exists in any large series of cases has been repeatedly shown, and on the basis of data so obtained rigid limits of blood alcohol concentration above which legal intoxication is assumed to exist have been fixed by several states. These all agree more or less with the figure pronounced by the National Safety Council of 150 mg. per hundred cubic centimeters of blood.

The experimental data on which this pronouncement has been made leave something to be desired from the standpoint of control and objectivity. As a matter of fact the point most frequently lost sight of is that, while the correlation may be excellent from the statistical standpoint, in order that a man may be convicted of drunken driving because his blood alcohol concentration was found to be 150 mg. per hundred cubic centimeters it is essential that this blood alcohol concentration be shown to produce legal intoxication not in a majority of individuals but in every individual. Failing this, it is inevitable that certain convictions will be unfairly obtained. With this in mind it is of interest to inspect the data which have appeared in the medical literature.

Bogen [1] found a high degree of correlation between the breath and urine alcohol concentration of patients and their degree of intoxication as judged clinically. With alcohol concentrations below 100 mg. per hundred cubic centimeters none were adjudged intoxicated, with 100 to 200 mg. 50 per cent were intoxicated, with 200 to 300 mg. 75 per cent were intoxicated and with 400 mg. and over "almost" all were intoxicated. From this he concluded that tissue alcohol concentration was the best single criterion of drunkenness. Yet the variation in tolerance to alcohol is apparent from his own figures, which show that at alcohol concentrations of from 100 to 200 mg. per hundred cubic centimeters half the individuals were intoxicated, while some few were not so diagnosed with over twice this concentration, and if we were to subscribe to the limit of 150 mg. per hundred cubic centimeters laid down by the National Safety Council at least 25 per cent of the patients would have been wrongly convicted of drunkenness on the basis of alcohol concentration.

Similar results were reported by Jetter [2] in 1,000 hospital entries. Considering only the extremes, he found 10 per cent intoxicated at a blood alcohol level of 50 mg. per hundred cubic centimeters and 93.3 per cent at 400 mg. per hundred cubic centimeters. Thus an occasional individual was not considered intoxicated at a blood alcohol concentration eight times as high as that at which 10 per cent were considered intoxicated. Smith and Stewart [3] are more conservative, considering the test of value in determining how much alcohol has been ingested but not in the diagnosis of the degree of intoxication.

This variation in tolerance to alcohol, which has long been a matter of common knowledge, was demonstrated experimentally in dogs by Newman and Card [4] and in man by Bahnsen and Vedel-Petersen [5] and by Schmidt.[6] The latter administered a dose of alcohol to a group of subjects and determined its effect on various acts requiring the same type of skill required in motor driving. Individual variation was well demonstrated, for, though the majority showed significant losses in performance, some subjects showed an increase in skill, possibly attributable to practice.

EXPERIMENTAL WORK

It seemed desirable that the test situation should conform as nearly as possible to that prevailing in the actual operation of a motor car. The subject sat in an ordinary adjustable driver's seat. In front of him, in the normal position, were the steering wheel, clutch, brake and accelerator pedals. Behind the steering wheel an aperture at approximately eye level represented the outlook through the windshield, and in this aperture appeared a facsimile of the radiator cap and hood of a car, the movement of which from side to side could be controlled by the steering wheel. Behind the radiator cap, filling the aperture, was a photographic scene depicting a three lane highway, in the right hand lane of which the rear elevation of a truck was apparent. This scene was actuated by an irregular cam so as to move with varying speed in an unpredictable manner from side to side behind the aperture, and it was the

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1. Bogen, Emil: Drunkenness: A Quantitative Study of Acute Alcoholic Intoxication, J. A. M. A. **89:** 1508 (Oct. 29) 1927.

2. Jetter, W. W.: Studies in Alcohol: I. The Diagnosis of Acute Alcoholic Intoxication by Correlation of Clinical and Chemical Findings, Am. J. M. Sc. **196:** 475 (Oct.) 1938; II. Experimental Feeding of Alcohol to Nonalcoholic Individuals, ibid. **196:** 487 (Oct.) 1938.

3. Smith, Sydney, and Stewart, C. P.: Diagnosis of Drunkenness from the Excretion of Alcohol, Brit. M. J. **1:** 87 (Jan. 16) 1932.

4. Newman, Henry, and Card, John: Nature of Tolerance to Ethyl Alcohol, J. Nerv. & Ment. Dis. **86:** 428 (Oct.) 1937.

5. Bahnsen, Paul, and Vedel-Petersen, Kontorchef: Alcohol Studies: I. Experiments on Drivers of Motor Vehicles, J. Indust. Hyg. **16:** 304 (Sept.) 1934.

6. Schmidt, Max: Alcohol Studies: II. Concentration of Alcohol in the Blood, J. Indust. Hyg. **16:** 355 (Nov.) 1934.

objective of the subject so to move the steering wheel controlling the radiator cap that this object remained directly in line behind the truck. An electric stop-watch recording hundredths of a minute remained in motion as long as the alinement of radiator cap and truck was maintained, but as soon as a deviation of one-eighth inch either way occurred the clock stopped and a signal light in view of the subject on the side to which the

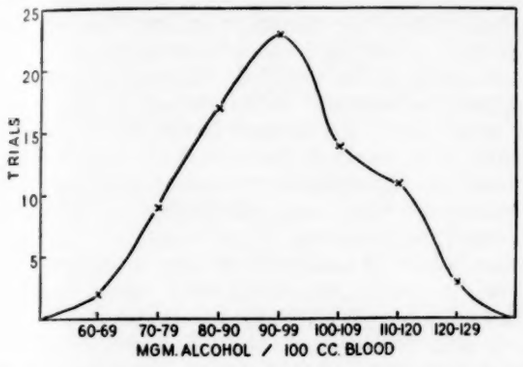

Chart 1.—Distribution curve showing the concentration of alcohol in the blood after ingestion of a dose of 1 cc. per kilogram of body weight in seventy-nine trials.

deviation occurred went on. On correction of the deviation the light went out and the clock restarted. Thus the percentage of time that alinement was accurate could be recorded. This test will be referred to as simple steering.

In the road scene, close beside the truck, were two small holes, behind one of which was a green light and behind the other a red light. Pressing on the accelerator pedal caused the green light to come on. At an unpredictable time thereafter the green light would go out and simultaneously a red light would appear and a stop-watch recording hundredths of a second would start. It was the object of the test to press on the brake pedal as soon as the red light was perceived, causing it to be extinguished and the clock to stop, recording the reaction time in hundredths of a second. This test will be called simple braking. The two tests could be operated simultaneously, and this procedure was designated vigilance steering and braking. All the figures reported represent the percentage loss in efficiency after alcohol, referred to the control score of the same individual before drinking. Thus for each individual we had a test primarily of coordination, simple steering, one primarily of reaction time, simple braking, and one combining the two factors and bringing in more strikingly the factor of attention, vigilance steering and braking.

Alcohol was administered in the form of commercial whisky, diluted to taste with carbonated water and imbibed in fifteen minutes. The routine of the test was as follows: A minimum practice period of fifteen minutes, preferably on a day prior to the actual test, was required. This was effective in minimizing the possibility of increase in efficiency due to practice. When the subject presented himself at the laboratory for the test he was given five trials of simple braking, followed by one trial of simple steering, then three trials of vigilance steering and braking, then five final trials of simple braking, one of simple steering and one of vigilance steering and braking. The values reported are averages of all trials. Immediately on the completion of this control series, which required about fifteen minutes, the alcohol was given, and at the end of one hour a second identical series of tests was given and a sample of venous blood taken for alcohol analysis.[7]

Ninety-eight such trials were performed on sixty-five subjects, of whom eight were women. The subjects, all in good health, consisted mainly of physicians and medical students, with a few skilled workers, and was thus fairly homogeneous as to general cultural level.

The dose of alcohol was 0.5 cc. per kilogram on four occasions and 1 cc. on seventy-nine, while in ten subjects an additional 0.5 cc. was given after the completion of the first test, and in one subject still an additional 0.5 cc. after the second dose, making 2 cc. per kilogram in all. The distribution of alcohol concentrations after the 1 cc. dose is shown in chart 1.

Considering the whole mass of data, the correlation between various factors was calculated by the Pearson correlation coefficient formula, with which a correlation coefficient of 1.0 indicates perfect and 0.0 no correlation. Comparing blood alcohol concentration in our series with percentage loss in vigilance steering and braking, which was undoubtedly our best measure of loss in driving skill, we obtained a correlation coefficient of 0.485 plus or minus 0.077. When it is recalled that a slightly better correlation, namely 0.5, exists between the height and weight of a population, it readily will be seen that the correlation between loss of driving skill as measured by our tests and blood alcohol concentration is not very great, as is graphically represented in chart 2.

The crude scores in the tests showed less correlation with loss in efficiency than the percentage loss in the tests, the variation in skill from individual to individual often outweighing the changes brought about by alcohol. When distribution curves for simple steering and simple braking before and after alcohol are constructed, it is apparent that, while there is a definite shift in performance toward the poorer side in both cases, considerable overlap of the curves is present. However, it is of interest to note that in spite of this the crude scores of simple steering show a correlation with our best index of intoxication, loss in vigilance steering and braking, of 0.576 plus or minus 0.068, which is actually

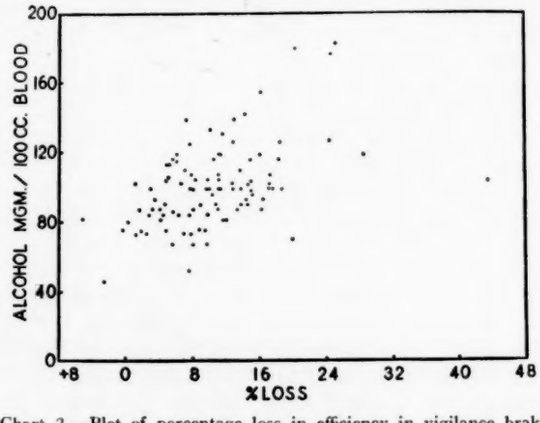

Chart 2.—Plot of percentage loss in efficiency in vigilance braking and steering against blood alcohol concentration for the entire group.

better than the correlation between loss of performance on the combined test and blood alcohol concentration. Thus it can be stated that performance in the test of simple steering is a better criterion of intoxication than is blood alcohol concentration and might be used profitably along with other tests in the diagnosis of drunkenness.

7. Newman, H. W.: The Determination of Ethyl Alcohol in Body Fluids, J. Pharmacol. & Exper. Therap. **56**: 278 (March) 1936.

An endeavor was made to break down the group as a whole into smaller groups of differing characteristics to determine possible variations from the general trend on this basis. No significant correlation was found between loss of efficiency from alcohol and the factors of age, sex, driving experience or drinking habits. With regard to the last of these, it should be noted that there were no really heavy drinkers in our series.

Several of the subjects made the statement prior to the test that in their opinion their driving skill was somewhat improved by moderate doses of alcohol, and a few felt that they did better in the test after drinking. It is of interest to note, therefore, that in no case was the performance in all the tests improved after alcohol. True, in seventeen of the trials there was improvement in one or more of the tests, but it is very probable that all these gains may be ascribed directly to practice rather than to any stimulating effect of alcohol, the gains being of the magnitude of those apparent in the control series.

COMMENT

The tests showed themselves to be well adapted to the demonstration of loss of efficiency in certain skills employed in the operation of a motor vehicle, giving consistent results in the same individual on different occasions. It was obvious that blood alcohol concentration in the individual case was a poor indicator of drunkenness as manifested by loss in skill in the acts tested, a fact in accord with the results of the previously published work cited. The important matter is to give full significance to this fact and not to carry over the apparent tendency for individuals with the highest blood alcohol concentrations to exhibit the greatest loss of skill into the arbitrary setting up of a fixed blood alcohol concentration at which a majority of individuals are intoxicated to apply equally to all individuals. If any blood alcohol concentration is to be accepted as absolute evidence of intoxication in the legal sense, it is essential that it be one at which experience has shown that no individual, regardless of his inherent or acquired tolerance, would be clinically adjudged sober. Concentrations lower than this might be of definite value as contributory evidence of drunkenness, but no more.

There can be little doubt that the operation of motor vehicles would be safer if the drivers were prohibited from consuming any alcohol whatever. However, the recent experiment with more generalized prohibition has effectively demonstrated the inability to enforce legislation so generally unpopular, whatever may be our opinion of the advisability of such laws. Public sentiment is definitely against the drunken driver but not against the drinking driver. Thus any attempt to control the problem by obtaining convictions on the sole basis of blood alcohol concentrations such as the 150 mg. per hundred cubic centimeters advocated by the National Safety Council must fail for the reason that such action would constitute the punishment of drinking rather than of drunken driving. Haggard,[8] in defense of such measures, cites the speed limits imposed by most states as an example of legislation requiring all drivers to conform to standards safe for the least skilful of them. We are all familiar with the disregard for such laws shown by otherwise law-abiding citizens, so that rather than being an argument in favor of further legislation of the same type our experience with arbitrary speed limits should point a lesson as to the public reception of similar laws in the future.

Rather should we look to the education of the operators of motor vehicles regarding the effect of alcohol on their driving abilities. For this purpose it is necessary that we amass data which will show that alcohol, even in moderation, does have a deleterious effect on the driving skill of most persons.

In spite of efforts at education, enforcement must always be a part of the campaign against drunken driving. For this to be justly and effectively carried out, two issues need to be clarified. The first of these is an adequate and uniform definition of intoxication as applied to drivers. The second is the development of tests which will establish the presence of this degree of intoxication. A rational procedure would seem to be the setting up of minimum standards of skill, as tested by as many procedures as possible, to be required of any person before he is allowed to drive a motor vehicle. A driver suspected of intoxication could then be retested, and if his performance fell below the accepted standard, and presence of alcohol in his blood was proved, a conviction should result regardless of the actual blood alcohol concentration found. Thus any person who so lowered his driving efficiency below the minimum accepted standard would be convicted, without penalizing other individuals of greater skill whose only offense consisted of the presence of alcohol in their blood stream.

8. Haggard, H. W.; Greenberg, L. A., and Cohen, L. H.: Quantitative Differences in the Effects of Alcoholic Beverages, New England J. Med. **219**: 466 (Sept. 29) 1938.

BIOLOGIC FALSE POSITIVE SEROLOGIC TESTS FOR SYPHILIS

III. A SUGGESTED METHOD OF APPROACH TO THEIR CLINICAL STUDY

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Earlier papers of this series have drawn attention to the occurrence of biologic false positive serologic reactions for syphilis in normal persons [1] and in those with diseases or conditions other than syphilis.[2] For normal persons it has been estimated,[3] on the basis of serologic surveys of large groups of presumably normal white American university students of both sexes, that the incidence of biologic false positive reactions in this particular population group is probably less than 1 in 4,000. As to diseases and conditions which may produce biologic false positive reactions, it has been further pointed out that their probable frequency is known, on the basis of published studies, only in yaws (100 per cent), leprosy (from 40 to 80 per cent), malaria (100 per cent at some time during the infection) and infectious mononucleosis (about 20 per cent). In diseases or conditions other than these no estimates of frequency are as yet possible, since the biologic false positive reaction in patients with acute infections is often only a transitory phenomenon, recognition of which may

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1. Mohr, C. F.; Moore, J. E., and Eagle, Harry: Biologic False Positive Serologic Reactions for Syphilis: I. Occurring in Normal Individuals, to be published.

2. Mohr, C. F.; Moore, J. E., and Eagle, Harry: Biologic False Positive Serologic Reactions for Syphilis: II. Associated with Organic Diseases Other Than Syphilis, to be published.

3. Eagle, Harry: On the Specificity of Serologic Tests for Syphilis as Determined by 40,545 Tests in a College Student Population, Am. J. Syph., Gonor. & Ven. Dis., to be published.

depend not on single tests performed at random but on repeated tests, daily if possible, carried out during the entire course of the infection. Nevertheless, though estimates of incidence cannot be made, characteristic examples of biologic false positive tests have been reported [2] from our own clinic in acute infections of undetermined origin, acute infections of the upper respiratory tract (including pneumonia), vaccinia, infectious mononucleosis, rat bite fever and perhaps typhus fever. Within two or three years at least forty examples of biologic false positive tests, either in normal persons or in those with the diseases enumerated, have come under our personal observation, and twenty-one of these have been reported in the two papers already referred to.[4]

The recognition of such biologic false positive tests is of great importance, in view of the increasingly widespread use of routine serologic testing in medical practice, in industry and by legislative fiat (as in compulsory premarital and antepartum examinations). It is as thoroughly undesirable to make a diagnosis of and treat for syphilis a patient who does not have it as to miss the diagnosis in one in whom it exists. Every physician is familiar with the social and psychologic tragedies which may be precipitated by the diagnosis of syphilis, and every effort should be made to avoid false diagnoses.

Our concern in this respect, which has gradually increased during the past few years, is shared by others, notably Kahn,[5] whose work on the subject will be mentioned presently.

In April 1940 one of us [6] published a brief outline of a procedure for the attempted differentiation of biologic false positive serologic reactions for syphilis from those positive reactions actually due to the disease. It seems desirable, in view of the increasing importance of the subject, to amplify and expand this outline.

At the outset, it should of course be said that when a positive serologic reaction for syphilis is obtained in a patient who gives no history or shows no physical evidence of the disease the test should at once be repeated—and before the patient is told of the original result—in order to exclude a technical false positive result. This having been done, it is usually necessary to recheck both history and physical examination for actual clinical evidences of syphilis, since, unless the examiner has the possibility of syphilis in mind before the serologic reaction is first obtained, both are likely to be sketchily inadequate.

THE HISTORY OF SYPHILIS

It is common experience that a history of infection with syphilis is hard to obtain. Of patients with proved late syphilis of various types, at least one third of the men and one half of the women can give no story of early symptoms. As Stokes [7] so well points out, this may mean that actually there were no early lesions, that the patient misinterpreted and dismissed as of no importance those which did occur or that he has really forgotten them. It may mean that the questions were asked in unfamiliar language rather than in the vernacular which the patient understands, that he was not questioned privately, that he was questioned in such a manner as to imply that infection is inconceivable, or that a third degree tone was used. "No patient will admit ignominy, expressed or implied." Finally, it may mean that the patient was not asked about antisyphilitic treatment. A recent case comes to mind in which a careful examiner wrote on the patient's record "Denies syphilis by name and symptom" and was surprised to receive an unexpectedly positive serologic report and chagrined when a syphilologic consultant subsequently elicited from the patient (who had not intended to lie) a story not only of early syphilis but of three years' treatment for it, including seventy-two injections of an arsphenamine and sixty-one of bismuth, and two lumbar punctures!

When a history of infection with syphilis or of treatment for it is not obtainable, the risk of possible exposure should be asked for and noted. What story of premarital and extramarital sexual exposures can be elicited, and, if these occurred, were they infrequent and with social equals or promiscuous and with prostitutes? Is the patient married? If so, at least one contact can and usually must be examined for objective evidences of infection. Has the patient been married more than once? Such information as may be available concerning the former spouse's health and extramarital sexual habits should be obtained and, if dead, the cause of death. Has there been opportunity for extragenital infection, as in promiscuous kissing or, in the case of physicians, nurses and dentists, through professional exposure to syphilitic patients? Has the patient ever been infected with any venereal disease, especially gonorrhea? All these points are of collateral value in establishing the opportunity for infection with syphilis, if not its actual occurrence.

THE PHYSICAL EXAMINATION FOR SYPHILIS

A physical examination for syphilis is not complete unless it consists of thorough dermatologic examination (the patient stripped and the skin and mucosae carefully examined in good light), and thorough general medical and neurologic examination, including the use of the ophthalmoscope. The statement "There is no physical evidence of syphilis" is not acceptable unless at least this much has been done. When physical abnormalities are present, great care is sometimes necessary in their interpretation, as illustrated by two of our recent patients. One with herpes progenitalis and coincident pityriasis rosea had been elsewhere diagnosed as having primary and secondary syphilis; the other, with a retrosternal thyroid and perforation of the nasal septum due to chrome poisoning, had been thought to have syphilitic aortitis and a nasal gumma.

What serologic evidence of syphilis shall be accepted in apparently normal persons with no history of infection or of treatment for it? By and large, repeatedly positive serologic tests in a reliable laboratory, if confirmed by more than one standard technic (and especially if both a complement fixation and a flocculation procedure are used) mean latent syphilis in a person lacking history or physical evidence of the disease, provided there has been an opportunity for such infection to occur. Sometimes, perhaps often, it may be desirable to check the reliability of the laboratory by duplicate tests and by tests made in a different laboratory. Not only does this guard further against technical error but also a rare patient may, for unknown reasons, give consistently positive reactions in one laboratory and negative reactions in all others (Stokes has seen one such case, and one of us (J. E. M.) has seen another).

4. Mohr, Moore and Eagle (footnotes 1 and 2).
5. Kahn, R. L.: A Serologic Verification Test in the Diagnosis of Latent Syphilis, Arch. Dermat. & Syph. **41**: 817 (May) 1940.
6. Moore, J. E.: A Suggested Method of Approach to the Recognition of the Biologic False Positive Serologic Test for Syphilis, Bull. Genito-Inf. Dis. **3**: 1 (April) 1940.
7. Stokes, J. A.: Modern Clinical Syphilology, Philadelphia, W. B. Saunders Company, 1934, p. 61.

Quantitative serologic testing as a method of determining the validity of the serologic diagnosis of syphilis will be discussed in detail presently.

When shall serologic evidence of syphilis be doubted? As Stokes humorously puts it, there are "instances . . . in which one [positive] Wassermann test will convict a laborer over his own denial, two will make a case against a banker or a railroad president, but three successive positives will scarcely convince the medical adviser of the 'guilt' of a clergyman." True as this is, every physician has patients for whom, for entirely personal and mostly undefinable and intangible reasons, he is hesitant to accept a purely serologic diagnosis of syphilis.

Specifically, on clinical grounds, he is justified in suspecting as false a positive serologic result in at least two categories of patients: (1) young girls or young women who, lacking history or physical evidence of syphilis, have not been demonstrably sexually exposed (virginity should be objectively demonstrated in such cases by intactness of the hymen), and (2) persons of either sex and of any age who, also lacking historical or physical evidence of syphilis, are found to have positive reactions at an interval after one or more previously negative reactions and who deny exposure in the interim (examples of each of these categories are cited in one of the previous papers of this series [1]).

On serologic grounds, one is justified in suspecting as false a positive reaction in a patient who, lacking historical or clinical evidence of infection and, whatever his history of potential exposure, gives a series of conflicting results when tested by different technics or at different laboratories.

SUGGESTED PROCEDURES WHEN BIOLOGIC FALSE POSITIVE TESTS ARE SUSPECTED

The diagnosis of syphilis is so potentially serious that whenever the suspicion of it arises every effort should be be made to verify or deny it. When there is clinical or serologic reason to doubt a confirmed positive serologic report, a number of procedures, some clinical, some laboratory, should be instituted as aids in arriving at a conclusion. None of these procedures, taken alone, are definitive; the ensemble is usually necessary. The first has already been mentioned, i. e. an exhaustive anamnestic and physical search for evidences of syphilis itself. If, as is often the case, such a search is fruitless, one should proceed as follows:

1. Take a careful history as to (*a*) symptoms of some intercurrent infection of whatever nature, (*b*) serum treatment (including tetanus antitoxin) or (*c*) vaccination within the four months preceding the questionable serologic test. It must not be forgotten, as some of our illustrative cases show,[2] that a reagin-like substance may persist in the blood for several weeks or even months after recovery from certain acute infections.

2. Make a careful physical examination for evidences of acute infection preceding the questionable serologic test, with special reference to lymph nodes, spleen and lungs. The lymph node enlargement of infectious mononucleosis may persist for several weeks after the acute infection subsides, as may also basilar remains of an acute infection of the upper respiratory tract.

3. Make a thorough search of blood smears for malarial parasites. This is especially important in the Southern states, where malaria is endemic and chronic malarial carriers are common.

4. Examine blood smears for infectious mononucleosis. This may involve inspection of the smear and a differential count by a trained hematologist. Abnormal cells of the lymphocytic series are especially important. The cytologic abnormalities of infectious mononucleosis tend to disappear promptly with subsidence of symptoms of acute illness (Bernstein [8]), and the smear may be normal at a time when the false positive serologic test persists.

5. Make a blood test for heterophile antibody (the Paul-Bunnell test). This is specific for infectious mononucleosis. Heterophile antibody tends to persist in the blood for from four to five months after the onset of acute symptoms of illness and gradually to disappear. It has been reported to persist for as long as six months (Bernstein). The disappearance of the positive serologic test for syphilis does not necessarily parallel the disappearance of heterophile antibody; the duration of the former is usually brief, but it may persist for as long as three months after recovery from illness.

In connection with paragraphs 4 and 5, it should be emphasized that infectious mononucleosis is almost certainly a much more common infection than it is usually thought to be. Its apparent prevalence among physicians, nurses, medical students and hospital employees is due only to the fact that such persons, being constantly in or near hospitals, are much more likely to have blood counts made for minor acute infections than are other patients. Further, it should be emphasized that the clinical manifestations of the disease are often trivial, consisting of no more than a day or two of slight sore throat with low grade and perhaps unnoted fever. Infectious mononucleosis is a possibility seriously to be investigated in all suspected false positive serologic reactions, especially in young persons.

6. Determine the sedimentation rate. The sedimentation rate is thought to be considerably increased in early syphilis and in neurosyphilis; it may be normal or, more frequently, slightly increased in late and in latent syphilis. Also it is frequently increased to an even greater degree in many of the acute infections, which may be responsible for false positive serologic reactions. In the latter, it tends to fall toward normal as the acute infection subsides; in syphilis, on the contrary, it tends to remain moderately elevated until some weeks after the institution of antisyphilitic treatment. A greatly increased sedimentation rate observed during an acute illness, which is accompanied by positive serologic tests for syphilis but which tends spontaneously to fall toward normal as acute symptoms subside, speaks moderately in favor of a biologic false positive serologic reaction. On the other hand, normal sedimentation rates may occur in normal persons with biologic false positive serologic reactions.

7. Repeat serologic tests for syphilis by several different technics including both complement fixation and flocculation, at least one of which is quantitatively titered.

This requirement leads to a brief consideration of the value of serologic quantitation in the diagnosis of syphilis, a subject which has been considered in detail in another paper of this general series.[9] In general, enormous variations in titer (from 0 to 1,600 units) are observed in all types of clinical involvement, including both early and late syphilis. On the average, the reagin titer is higher in early syphilis (100 + units) than in

8. Bernstein, Alan: False-Positive Wassermann Reactions in Infectious Mononucleosis, Am. J. M. Sc. **196**: 79 (July) 1938; Infectious Mononucleosis, Medicine **19**: 85 (Feb.) 1940.

9. Moore, J. E., and Eagle, Harry: The Value of Quantitative Serologic Testing in Syphilis, to be published.

any form of late syphilis (from 20 to 50 units). A single quantitative titration by any technic is therefore of no diagnostic value, since a low titer test is as likely to mean syphilis as a high titer test. In general, therefore, the only significance to be attached to a single titer test is in those patients, usually young, who, if infected with syphilis at all, have probably acquired the disease recently and who might therefore be expected to give high titer reactions.

Kahn [10] has suggested that quantitative titration should be of value in differentiating false positive serologic tests from those positive tests actually due to syphilis, in that the former should be generally low and the latter generally high in titer. In our experience, the false positive serologic reactions occurring in normal persons [1] are usually low titer (from 0.5 to 5 units). Among persons suffering from diseases other than syphilis, far too little experience with serologic quantitation has accumulated to permit any conclusions as to titer in nonsyphilitic diseases, with the exception of leprosy, in which Wassermann titers are often high and flocculation titers usually low; [11] but enough information is contained in our own material [2] to indicate that even high titer reactions may be caused by still other nonsyphilitic conditions.

While a single quantitatively titered test is of no definitive value in differentiating false from true positive tests, a series of such tests over days, weeks or even months may be decisive. In general, if the positive reaction is false, it tends spontaneously to decrease in titer and finally to disappear. On the other hand, if the positive reaction is due to syphilis, it may, in the absence of antisyphilitic treatment, either spontaneously increase in titer (early syphilis) or remain at about the same level. In this connection it must be emphasized that serial quantitative titrations, to be of any value, must be carried out in the same laboratory by the same technic (preferably flocculation rather than complement fixation) and even then such tests are only roughly comparable, owing to unavoidable day to day variations in the sensitivity of the test.

As to serologic quantitation, then, the only value of a single test is that one may suspect as false low titer tests in young persons, who, if infected at all, may be presumed to have been recently infected and who should therefore have large amounts of serum-reagin.

The requirement that serologic tests be performed by several different technics necessitates another word of caution. Serologic tests vary in sensitivity both qualitatively and quantitatively. Qualitatively they may differ in the sense that in some cases a complement fixation test may be positive when more sensitive flocculation tests are negative. So far as our experience goes, such paradoxical results are largely confined to the following clinical categories:

(*a*) Patients with late congenital syphilis, treated or untreated [12] (the reason for this phenomenon in untreated late congenital syphilis is unknown).

(*b*) Patients with acquired syphilis who have had a great deal of antisyphilitic treatment.

(*c*) Infectious mononucleosis, malaria and perhaps other nonsyphilitic conditions.

Quantitatively, flocculation tests are in general more sensitive than complement fixation tests [13] and may be divided into two groups: supersensitive screen procedures (Kahn presumptive, Kline exclusion) and less sensitive standard diagnostic procedures (Kahn, Kline, Hinton, Eagle). When several technics are used, the physician is justified in suspecting as false positive results which are paradoxically negative with more sensitive and positive with less sensitive technics.

8. Repeat serologic test for syphilis in several different laboratories of known excellence in order to rule out all possibility of technical error. Suspect as false tests positive in one laboratory, however, excellent, and negative in all others.

9. Perform the Kahn "verification test." This procedure, described by Kahn and his associates [5] in several recent communications, depends on the fact that syphilitic reagin appears to flocculate the Kahn antigen best at 37 C., while the reagin-like substance present in the blood of many lower animals, of the occasional normal human being and of some patients with diseases other than syphilis flocculates best at 1 C.

In this connection it should be pointed out, however, that Kahn's work with this test is as yet on a small scale and has not been confirmed by other investigators. Until it rests on firmer ground than at present, a negative "verification test" should not be accepted as absolute evidence of the false positivity of other serologic tests.

10. Test the patient's serum by complement fixation with spirochetal antigen (the Reiter or Kazan strain of cultured Spirochaeta pallida). This test, known in Germany as Gaehtgen's "palligen" test, has a considerable European literature. In this country Eagle has studied it,[14] though unfortunately the antigen is not yet commercially available in the United States. There is reason to believe, however, that such spirochetal suspensions may give more specific results than tissue lipoids used in the Wassermann and flocculation tests, thus permitting the identification as false reactions of some of the positive results obtained in the absence of syphilitic infection. This is certainly the case in leprosy [15] but is apparently not true in malaria.[16] Other nonsyphilitic diseases have not yet been sufficiently studied to permit conclusions in this respect. Several of our apparently normal patients [1] as well as those with nonsyphilitic diseases [2] have, however shown negative results with a spirochetal complement fixation test while positive with standard technics, and we have laid some weight on this point in the final decision as to the validity of serologic results.

11. Test the patient's serum with wholly nonspecific antigens, such as those prepared from bacteria (the gonococcus, staphylococcus, tubercle bacillus) or from such substances as milk and lecithin. Certain persons apparently possess the peculiar property of reacting positively to all complement fixation tests. One such case has been reported by us (case 2).[1]

10. Kahn, R. L.: Facts Regarding the Quantitative Kahn Reaction, Ven. Dis. Inform. **20**: 255 (Sept.) 1939.

11. Eagle, Harry; Hogan, R. B.; Mohr, C. F., and Black, S. H.: On the Reactivity of the Serum and Spinal Fluid of Leprous Patients with Spirochetal Suspensions, Am. J. Syph., Gonor. & Ven. Dis., to be published.

12. Moore, J. E.: Proceedings Assembly of Laboratory Directors and Serologists, Ven. Dis. Inform., supp. 9, 1939, p. 59.

13. Erickson, P. T., and Eagle, Harry: Spirochete Complement Fixation Reaction Compared with Eagle and Wassermann Procedures, Ven. Dis. Inform. **21**: 31 (Feb.) 1940.

14. Eagle, Harry, and Hogan, R. B.: On the Presence in Syphilitic Serum of Antibodies to Spirochetes, Their Relation to So-Called Wassermann Reagin, and Their Significance for the Serodiagnosis of Syphilis, J. Exper. Med. **71**: 215 (Feb.) 1940. Cappelli, E.: La "pallidareazione" di Gaehtgens sul sieri lebbrosi; contributo allo studio dell' essenza della r. Wassermann, Gior. di. batteriol. e immunol. **22**: 425 (March) 1939.

15. Nagell, H.: Ueber das Vorkommen unspezifischer Hemmungen bei der Wassermannschen Reaktion, Dermat. Wchnschr. **90**: 795 (June 4), 823 (June 21) 1930.

16. Heinemann, H.: Untersuchungen mit der Pallidareaktion, Dermat. Wchnschr. **94**: 680 (May 14) 1932; Ueber die praktische Brauchbarkeit der Pallidareaktion im Arbeitskreis des Tropenarztes, Arch. f. Schiffs- u. Tropen-Hyg. **36**: 9 (Jan.) 1932.

12. Carry out a prolonged serologic follow-up (weeks or months) by a good quantitative technic, testing the blood at frequent intervals without instituting antisyphilitic treatment. As already emphasized, these tests must be performed in the same laboratory by the same technic. False positive tests tend spontaneously to fall in titer; those due to syphilis tend to remain unchanged or to rise. The length of time that may be necessary to arrive at a decision is exemplified by the cases reported in our two previous papers.[4]

13. Examine members of the family and sexual contacts. This step in the examination may be extremely important. The suspicion of congenital syphilis, for example, may be dismissed if father, mother and siblings prove to be nonsyphilitic. The suspicion of acquired syphilis, especially if thought to be recent, may often be lessened if not dismissed entirely by the discovery that a husband or wife, constantly and intimately exposed and almost certain to have been infected were the patient syphilitic, has remained normal.

14. Examine the cerebrospinal fluid if a decision cannot be reached earlier. When there are genuine reasons for believing that the positive result is false, do not adopt spinal puncture as the first step in the investigation, since often a clearcut exploration (e. g. of infectious mononucleosis) can be found for the supposed false positive result. Unless the reason for false positivity is obvious, however, the patient should not be dismissed without a study of the spinal fluid, lest asymptomatic neurosyphilis be missed, with subsequent perhaps tragic results.

15. The so-called provocative procedure (injection of an arsphenamine with following quantitative serologic testing daily for fourteen days) is in our opinion worthless. In another paper of this series [17] we have cast doubt on the existence of the provocative phenomenon.

16. Finally, withhold antisyphilitic treatment unless and until the diagnosis of syphilis is proved. Such treatment is dangerous and should not be given unless the risk is justified by the actual existence of syphilis.

SUMMARY

From an outline of a method of approach to the differentiation of the biologic false positive serologic reaction from the positive result due to the presence of syphilitic infection, it is obvious that many of the suggested procedures require special clinical or laboratory expertness and that the final decision as to the presence or absence of syphilis in a given case is a highly individualized problem which often requires weeks or months of observation and expert syphilologic advice.

804 Medical Arts Building.

17. Eagle, Harry; Mohr, C. F., and Kemp, J. E.: The Value of the Provocative Serologic Test in Syphilis, to be published.

A Much Abused Term.—The term "scientific" in these modern days has come to be much abused. Many things that are popularly looked on as being scientific, and many persons who are said to look on life from a scientific point of view, are no more scientific than an infant in its cradle, however much the child is in process of being brought up on so-called scientific principles with a pediatrist on one side scientifically to measure its vitamins and calories day by day and a psychologist on the other scientifically to protect it from complexes—perhaps even to provide an infant chimpanzee as a comparative playmate. Thus does the quasi-Science of Medicine sometimes lead to absurdities from which medical practice, largely controlled by common sense, usually escapes.—Cushing, Harvey: The Medical Career and Other Papers, Boston, Little Brown & Co., 1940.

HYPOTHERMIA

SUBNORMAL TEMPERATURE AND ITS RELATION TO NEUROCIRCULATORY ASTHENIA (SOLDIER'S HEART)

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Over a period of several years, persons without obvious infection or organic disease whose average temperature was slightly but continuously higher than the usually accepted normal were selected for special study.[1] Of twenty persons studied, seventeen were women. Most of them had been suspected for months or years of having some obscure underlying infection or other disease to account for the "fever" and many had been needlessly subjected to prolonged expensive investigation or treatment to discover the cause. Because of the elevated temperature the condition was at first regarded as habitual hyperthermia, but it soon became evident that in most cases the "fever" was only one factor among many others which occur in certain so-called neurotic persons. Furthermore, most of the neurotic patients had signs and symptoms of syndromes commonly known as sympathicotonia or vagotonia, chiefly the former, or a combination of the two. It was also pointed out that average body temperature may vary among different normal persons just as does the pulse rate or blood pressure, and deviations from the accepted standard of the norm need not always be looked on as evidence of disease. Nevertheless a person whose average oral temperature is higher or lower than 37 C. (98.6 F.) and has the symptoms of a neurosis of whatever nature can hardly be regarded as normal. The calculated probable incidence of persons whose temperature consistently deviates from 37 C. (98.6 F.) is illustrated in chart 1.

As a matter of further interest a search was then made for persons whose average temperature is subnormal and falls under the left leg of the curve. Over a period of three years, hospital charts were continuously scrutinized for samples of temperature tracings which were consistently below the normal level. Patients with myxedema, Addison's disease, cachexia or shock or convalescent from infections or with chronic conditions known to cause or to be accompanied by hypothermia were excluded.

It was remarkable that the nine patients with hypothermia eventually selected for study were all men with predominant symptoms and signs of vagotonia. It may be recalled that, in studies of hyperthermia previously referred to,[1] most of the patients were women.

As the studies progressed it became more and more evident that the patients selected for observation had most, if not all, of the signs and symptoms characteristic of "neurocirculatory asthenia," variously called "soldier's heart," the "irritable heart of soldiers," "disturbed action of the heart" and "effort syndrome."[2] Had these cases been encountered during war time most of them no doubt would have been classed as such. Since neurocirculatory asthenia is a serious problem in all great wars, it is bound to be of immediate importance in this country as soon as the draft of men

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1. Reimann, H. A.: The Problem of Long Continued, Low Grade Fever, J. A. M. A. **107**: 1089-1093 (Oct. 3) 1936; Habitual Hyperthermia, Arch. Int. Med. **55**: 792-898 (May) 1935.

2. Lewis, Thomas: The Soldier's Heart and the Effort Syndrome, ed. 2, London, Shaw & Son, 1940.

for military service begins. It causes many difficulties in diagnosis and is one of the most frequent causes of invalidism among soldiers.

REPORT OF CASES OF HYPOTHERMIA

CASE 1.—A. F., a Jewish house painter aged 50, first came to the hospital in March 1936 complaining of pain in the left lower quadrant, loss of weight and general weakness for a year. He had had heartburn and constipation for years. His tonsils and all his teeth had been removed without relief of his symptoms. On physical examination no important abnormalities were discovered. Evidence of slight hypertrophic osteoarthritis of the spine was found on roentgenography. Laboratory studies of the blood and urine, including search for the presence of lead because of possible lead poisoning, gave negative results. A diagnosis of osteo-arthritis of the spine and sacro-iliac joints was made at that time.

The patient returned to the hospital a year later again complaining of backache, upper abdominal pain especially at night, anorexia and weakness. Certain powders given by his own physician often relieved the abdominal pain. Constipation was severe. Physical examination again showed nothing of diagnostic importance. Chemical studies for lead poisoning gave negative results. The blood, urine, gastric juice and bile were normal. The basal metabolic rate on two occasions was minus 17 and minus 25. Because the heart rate noted on the chart varied between 40 and 60 beats per minute, heart block was suspected but an electrocardiogram showed no abnormalities except bradycardia. No attention was paid to the temperature, which usually varied between 36.1 C. (97 F.) and 36.6 C. (98 F.) and did not reach 37 C. (98.6 F.) at any time. The blood pressure varied between 84 and 100 systolic and 55 and 70 diastolic.

Because of the low basal metabolic rate, thyroid substance was given first in 0.06 Gm. (1 grain) doses three times a day, later in 0.12 Gm. amounts and finally 0.54 Gm. (9 grains) a day for a period of two weeks. He complained of increased nervousness and dizziness and the drug was stopped. The basal metabolic rate rose to plus 12 during this treatment but fell to plus 2 a week later. There was no change in the symptoms, temperature level, pulse rate or blood pressure.

The patient tried to return to work but could not because of weakness. His wife said that the patient complained of symptoms only when his mind was unoccupied.

I became interested in the patient's temperature at this time and requested his return to the hospital for special studies. He now complained of insomnia, exhaustion and palpitation of the heart. This time the temperature as plotted never rose over 36.6 C. (98 F.), the pulse rate varied between 42 and 65 and the blood pressure between 80 and 100 systolic and 48 and 70 diastolic. The hospital chart is reproduced in chart 2. The subcutaneous injection of histamine hydrochloride 0.75 mg., atropine sulfate 1 mg., pilocarpine hydrochloride 1 mg. and of powdered opium 0.12 mg. orally on different occasions did not produce the abnormal effects said to occur in cases of vagotonia or sympathicotonia. Dryness of the mouth occurred after giving atropine, and a transient slight increase in pulse rate and blood pressure occurred with pilocarpine. Pressure on the eyeballs for two minutes caused no striking changes in blood pressure or heart rate. Jumping exercises caused the pulse rate to rise from 40 to 100 per minute but it returned to 40 after three minutes of rest. Amphetamine sulfate 20 mg. seemed to increase the pulse rate on two occasions from about 50 to 80 and once the blood pressure rose from 85 systolic, 50 diastolic to 110 systolic, 70 diastolic for eight hours. Amphetamine sulfate, in fact, when given daily in 10 mg. doses was the only medication which made the patient feel more energetic and active.

The patient was regarded as having a form of neurosis. He could be classed as a vagotonic type, in Eppinger and Hess's scheme, as far as the bradycardia and hypotension are concerned, but for the presence of constipation and normal response to drugs which supposedly stimulate the parasympathetic system. The low basal metabolic rates suggested hypothyroidism but treatment with thyroid substance failed to influence any of the signs or laboratory manifestations except the basal metabolic rate and caused mild symptoms of hyperthyroidism.

Because of the nature of the patient's complaints, his psychiatric reactions, the hypothermia, bradycardia and hypotension, he was regarded as a type of person in whom such phenomena are characteristic. They have often been classified as having vagotonia or neurocirculatory asthenia.

CASE 2.—H. N., a Jewish machine operator aged 54, complained of dizziness, attacks of vomiting, weakness and anorexia for six or eight months. Ten years before he had had all his teeth extracted for joint pains, and eight years before a peptic ulcer was diagnosed. He recovered without treatment. Two months before, according to a roentgenologist, he was said to have had colitis, but no symptoms were present.

Physical examination revealed essentially normal conditions except that chronic catarrhal otitis was present. His temperature during eighteen days of observation varied from 36 C. (96.8 F.) to 36.6 C. (98 F.) and rose to "normal," or 37 C. (98.6 F.), only twice. The pulse rate varied between 55 and 74, averaging about 65. The blood pressure was quite constant at 90 systolic and 60 diastolic. It reached 120 and 70 on one occasion. An electrocardiogram and laboratory studies of the blood, urine and gastric contents gave negative results. The basal metabolic rate was minus 19.

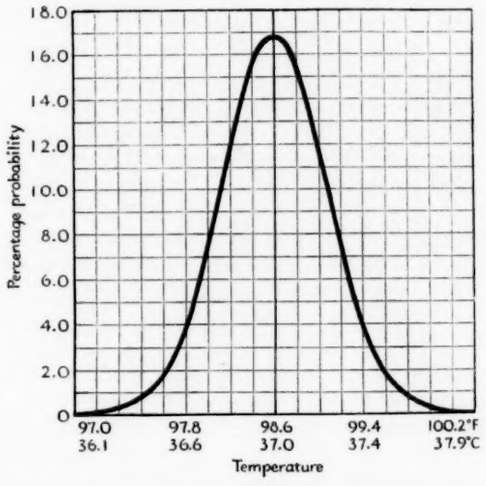

Chart 1.—Curve of the probable incidence of average normal oral temperature constructed from a table prepared by Dr. Frances Vanzant.

The patient reacted normally to the injection of pilocarpine hydrochloride, epinephrine hydrochloride, ergotamine tartrate and physostigmine.

The patient's symptoms disappeared without therapy and he left the hospital seemingly improved.

Although a diagnosis of neurosis may not be justified in this case since chronic otitis was found, his past history, present symptoms and relief without special therapy strongly suggest it. The low basal metabolic rate was not regarded as pathognomonic of hypothyroidism but, as in case 1, was presumably part of general constitutional habitus together with hypothermia, hypotension and bradycardia.

CASE 3.—S. Y., an unemployed Jew aged 60, complained of backache for fifteen years and nausea and pains in the shoulder since losing his job two years before. No important abnormalities were found on examination, except absence of all teeth. Laboratory and roentgenographic studies gave negative results except for an electrocardiogram in which the PR interval registered 0.24 second. The extreme range of his temperature over a fourteen day period of study was 35.2 C. (95.6 F.) and 37.3 C. (99.2 F.), the usual range from 35.5 C. (96 F.) to 36.6 C. (98 F.). It seldom exceeded 36.6 C. (98 F.).

The pulse rate was quite constant at 74 but the blood pressure was irregular, varying from 86 to 125 systolic and 56 to 80 diastolic.

The psychiatrist, Dr. Keyes, regarded this patient as having an "unemployment" neurosis.

CASE 4.—W. S., a physician's son aged 19, was known to have occasional albuminuria which gave a good deal of concern to his family. There were no complaints except frequency of urination when exposed to cold. He was tall, thin and pale and was of the "asthenic" type. No physical abnormalities were detected. Test of the urine showed no albuminuria while the patient was recumbent but from one plus to three plus while erect, particularly after exercise. There were many cylindroids and a few hyaline casts in most samples. The condition was regarded as orthostatic or postural albuminuria. His blood pressure while resting ranged from 108 to 130 systolic and 50 to 65 diastolic. It was not elevated by the moderate exercise of jumping twenty times but rose rapidly to 280 systolic and 110 diastolic after five minutes of rapid stair climbing.

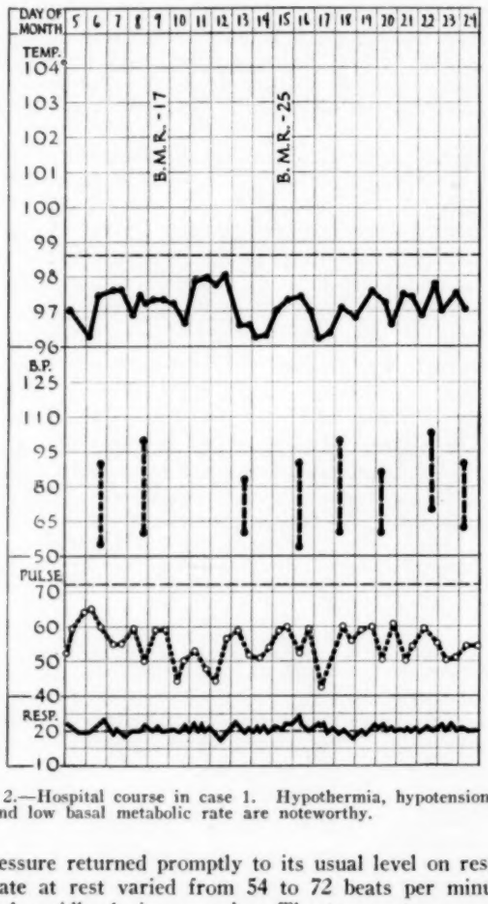

Chart 2.—Hospital course in case 1. Hypothermia, hypotension, bradycardia and low basal metabolic rate are noteworthy.

The pressure returned promptly to its usual level on rest. The pulse rate at rest varied from 54 to 72 beats per minute but increased rapidly during exercise. The temperature never rose above 36.9 C. (98.4 F.) during three days of observation. During the day it averaged 36.6 C. (98 F.) and at night 36 C. (97 F.). The lowest level recorded was 35.6 C. (96 F.).

In this case albuminuria attracted the attention and the hypothermia, hypotension and bradycardia would perhaps have been disregarded on casual study. The patient was of the asthenic, visceroptotic type with a labile and unstable vasomotor system.

Five other cases were studied which were similar and need not be described in detail. The ages ranged from 21 to 44 years and three of the patients were born in Europe. In four, gastrointestinal complaints, including dryness of the mouth, were predominant for months or years, and in one there were numerous bizarre complaints of chills, dizziness, choking sensations, dry throat, palpitation of the heart, bitter taste, headache, weakness and constipation, symptoms which are typical of a neurosis. Cold sweaty hands and dermatographia were present. One patient had the dilated pupils and the tachycardia characteristic of sympathicotonia yet his temperature was usually subnormal. Only one of the five showed an unusually strong reaction to small doses of atropine and of pilocarpine with marked dryness and hypersecretion respectively, although the pulse rate and blood pressure were unaffected. The temperature of all five patients averaged below normal, usually with bradycardia and hypotension while at rest. Exercise or emotional excitement often caused an exaggerated increase in the pulse rate and blood pressure. According to the psychiatrist, four of the patients had psychoneurosis. Their basal metabolic rates varied from minus 11 to plus 5.

COMMENT

In contrast to previous studies [1] of twenty cases of hyperthermia which were found to occur chiefly in women with evidence of sympathicotonia, all nine patients with hypothermia included in this report were men, most of whom were classed as vagotonic. While this predominance of one sex or the other in the two conditions seems suggestive, too few cases have been observed to judge whether such a difference is the rule or not. Information on consistent differences in temperature of men and women is meager. Recently Hardy and Milhorat,[3] in experiments on three women, found that the skin temperature of women was higher than that of men but only in a warm atmosphere. In a study among normal children,[4] girls were found to have temperatures over 99 F. more often than boys. Rautmann,[5] on the other hand, found the average temperature of a group of normal women a fraction of a degree lower than that of men.

It seemed that, in most patients studied, those whose average temperature was above normal usually gave evidence of sympathicotonia [1] while those with hypothermia were usually vagotonic, yet it is of interest to note that a given patient seldom had all the signs of either one syndrome or the other and more often had a mixture of the two. For example, several of the men with hypothermia gave the usual evidence of vagotonia with bradycardia and hypotension but complained of dry mouth and constipation and had dilated pupils, which are characteristic of sympathicotonia. One of them had tachycardia. At any rate the patients all showed evidence of nervous instability or imbalance. Evidence of slight imbalance may be found perhaps in the majority of otherwise normal persons in civil or military life. It is only when it becomes severe enough to cause noticeable disturbances that medical aid is sought. In certain persons accidents, injuries, psychic shock, infections or the physical and emotional strain during war or threatened war bring the symptoms to a clinical level. A list of the more important characteristics of vagotonia and sympathicotonia is given in the accompanying table.

While the existence of either hypothermia or hyperthermia alone may seem unimportant, their recognition together with other evidence of nervous imbalance, as reflected in various systems of the body, may give a clue to a correct diagnosis in certain puzzling cases. Much needless surgery or other unnecessary investiga-

3. Hardy, J. D., and Milhorat, A. T.: Basal Heat Loss and Production in Women at Temperatures from 23 to 36 C., Proc. Soc. Exper. Biol. & Med. **41**: 94 (May) 1939.

4. Van der Bogert, Frank, and Moravec, C. L.: Body Temperature Variations in Apparently Healthy Children, J. Pediat. **10**: 466-474 (April) 1937.

5. Rautmann, H.: Untersuchungen über der Variabilität der Korpertemperatur bei Gesunden, Ztschr. f. Konstitionslehre **13**: 588, 1928.

tion may thus be avoided and management guided along proper psychotherapeutic or physicaltherapeutic lines. As in most obscure diseases, undue attention has been given to foci of infection as a cause,[2] and many needless operations have been performed in the hope of relieving the symptoms. In this series of nine cases, the tonsils and some or all of the teeth had been removed in six, without beneficial effect. The symptoms in one case began immediately after tonsillectomy.

The majority of patients with hypothermia complained of gastrointestinal disturbances, various aches and pains throughout the body, dizziness, weakness and cardiac discomfort. Because of the variety of complaints, a variety of diagnoses was made in most cases, depending perhaps on the interest or specialty of the physician or succession of physicians consulted by the patient. For instance, in case 1, according to the opinion of different physicians, the occupation suggested lead poisoning, the complaints suggested arthritis and gastrointestinal disease; low blood pressure was considered as a cause of the disturbance, low basal metabolic rates suggested hypothyroidism, and bradycardia suggested heart block. Consequently numerous minor surgical operations, expensive laboratory investigation and many drugs were employed in diagnosis and treatment, most of which could probably have been avoided had less attention been focused on isolated signs and complaints and the syndrome recognized as a whole. Patients of this type are commonly diagnosed as having colitis, chronic appendicitis and focal infection and are often turned into the class of the "much operated on" chronic invalid so well known to most practitioners.

Some Characteristics of Vagotonia and Sympathicotonia

Vagotonia	Sympathicotonia
"Wet" type with increased oral, nasal, bronchial, intestinal and other secretions	"Dry" type with decreased secretions
Low temperature	High temperature
Low basal metabolism	High basal metabolism
Low blood pressure	High blood pressure
Slow pulse rate	Fast pulse rate
Vasodilatation	Vasoconstriction
Increased peristalsis	Decreased peristalsis
Contracted pupil	Dilated pupil

Granting that the type of patient described here belongs to that group of persons who are subject to vasoneurotic disorders and come into especial prominence in wartime, it is questionable whether such names as "soldier's heart" or any other terms directing attention chiefly to the vascular system are desirable. The terms have come into current usage perhaps because of the more obvious symptoms and the ease with which the pulse rate can be counted, but it is certain that many other abnormalities can also be found if sought for. It is thought that all the signs and symptoms, as in the cases described in this paper, are evidence of a neuropathic disposition based on hereditary and constitutional inadequacy.[2]

SUMMARY

Nine patients were studied whose temperature level was consistently subnormal. Besides hypothermia they usually had other signs and symptoms of vagotonia such as hypotension, bradycardia, palpitation, sweating, low basal metabolic rates and numerous bizarre complaints for which no organic basis could be found. The symptoms and signs manifested by these men are the same as those described in the conditions known as neurocirculatory asthenia, effort syndrome or soldier's heart and probably arise from similar causes. Unless patients of this type are given a correct diagnosis they may be subjected to much needless investigation and treatment and may be assigned to tasks beyond their limitations during military service. After possible organic causes for their disorder have been ruled out, treatment along psychotherapeutic and physical therapeutic lines is helpful.

EPIDEMIOLOGY OF TUBERCULOSIS

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In the long known nations, such as China, Egypt and Greece, consumption was described soon after man began to make permanent records. Where the disease originated we do not know, but its contagiousness was early suspected. As transportation developed, first through the use of beasts of burden and marching armies, then by sailboats, steamships, railroads, automobiles and finally airplanes, the disease was carried by persons in whom it was unsuspected and by persons who sought recovery of health from an ocean voyage or a change of climate.

For a long time there remained parts of the world where tuberculosis did not exist in man or animals. As it was carried to these places it spread among the natives, as it must have originally done in the long civilized countries. In some places it appeared in epidemic form, as manifested by illness of its victims. In all places it was in epidemic form but man did not have the refined methods of detecting its presence and it was therefore unsuspected in the majority of persons who had it and was recognized only in those whom it struck down. Not long ago the belief was held that tuberculosis was rare in the interior of Africa, but careful examination of 200,000 African boys employed in the gold mines revealed that 65 per cent had this disease in some phase of its development.

Of all the contagious diseases, tuberculosis has been the most difficult to control, partly because as it sweeps through a tribe, a family or a nation it does not leave a high percentage of immune persons, as does smallpox; on the contrary, it leaves the majority of those whom it attacks with living tubercle bacilli in their bodies, with serious future potentialities in many of them. It continues to strike these persons down, who if they had suffered from smallpox would be immune to that disease. The number of infected persons who fall ill each year is relatively small, but over a period of thirty or forty years the aggregate is large and is alarming to any nation that allows the disease to continue unmolested.

If tuberculosis is not opposed in a nation it will ultimately be present in some phase of its development in almost 100 per cent of the population. Among the animal herds, particularly cattle, if no control measures are used, it doubles itself every fifteen years.

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There was a time when it was thought that tuberculization of a nation of people was the only solution of the tuberculosis problem; that is, every one should be infected with tubercle bacilli. However, observation has revealed that in the nations where tuberculization is well nigh complete and where it has been in effect for centuries the morbidity and mortality from this disease are alarming. For example in China, where tuberculosis has existed for 5,000 years or more, one would expect a low incidence of clinical tuberculosis and a small death rate if tuberculization is the solution. In reality, in 1926-1927 Li reported that the mortality from tuberculosis in Peiping was 524 per hundred thousand and from 1927-1931 it was still 384, while from 1928 to 1932 in Shanghai the mortality rate was 244 and in Hong Kong 319. If these rates obtain throughout China with 400,000,000 or more people, approximately 1,200,000 lose their lives annually and if the Framingham, Mass., survey figures with reference to the number of living clinical cases per annual death are applied there now exist in China more than 10,000,000 persons with clinical tuberculosis, which Lee says is "a figure far exceeding the worst of any known epidemics in China."

In no nation where tuberculosis has been allowed to gain a foothold among the people or the domestic animals has it been known to die out; on the contrary, it spreads. Efforts of man have partially controlled it, as indicated by the reductions in morbidity, mortality and infection attack rates, but no nation has eradicated it. Witness the progress in controlling tuberculosis in some of the European nations before the World War and then observe how it spread like wildfire toward the end and immediately after the war in the same nations, largely because man's efforts against it were relaxed during the period of the war.

Another reason that tuberculosis has been so difficult to control is that it has always been so "kind to its hosts." The bacilli find lodgment in the tissues; they multiply and usually cause no unpleasantness until many of their progeny have been eliminated and have found habitations in the bodies of other persons. By the time the original host is aware of the presence of the disease through various symptoms, many of the patient's associates have already been infected and the lesion has made such inroads in the original case that an ultimate fatal issue is almost certain in a high percentage of persons. Therefore the healthiest appearing person in the community or the sleekest animal in the herd might be disseminating tubercle bacilli from lesions which had caused no incapacity.

The incubation period of tuberculosis ranges from three to seven weeks. At the end of this time mild symptoms may appear, such as elevation of temperature and slight malaise. There usually is no cough or expectoration, even when the lesions are located in the lung. The tissues are now found to be sensitized to the protein fraction of the tubercle bacillus, as manifested by a characteristic reaction when tuberculin or purified protein derivative is administered intracutaneously. The red cell sedimentation rate is increased. The symptoms when present are of slight duration and usually the individual is not seen by a physician. In the occasional person for whom a physician is consulted, the symptoms are often mistaken for a mild attack of influenza.

Thus the first manifestations of the disease are usually extremely mild and are unlike those often seen in such other contagious diseases as typhoid and scarlet fever. With the latter group of diseases, following the first attack the infecting organisms usually die and the body is left with a reasonably good immunity against subsequent attacks. With tuberculosis, however, like syphilis, at the end of the first manifestations the organisms do not die but remain alive and virulent at some of their points of focalization, particularly in the regional lymph nodes. Moreover, the first attack of tuberculosis does not produce dependable immunity against either exogenous or endogenous reinfections.

The organisms in the lesions of the primary complex may remain there and never cause clinical lesions; again, they may spread from place to place through the lymphatic system, the blood stream and the bronchial tubes; they may gain access to the meninges through the rupture of a primary focus in the central nervous system and thus, at any time after the original infection occurs and the primary complex is established, new lesions may appear. If these lesions occur or develop in organs that have communications with the outside world, such as the intestinal, the urinary or the respiratory tract, tubercle bacilli are eliminated, after which they may gain entrance to the bodies of other persons, where they set up foci of disease. Probably the most common site, and certainly the most dangerous one from the standpoint of perpetuation of the disease, is the lung, since involvement of this organ often results in necrosis of sizable areas which find their way into the bronchial tree and are expectorated. Following this evacuation of the dead tissue, cavities remain, in and around which there may be marked proliferation of tubercle bacilli. Because of the communication with the outside world, many of these organisms are eliminated from the body daily. Thus the person who has such a condition has contagious tuberculosis; he may be ill or he may have no impairment whatever of working capacity. Yet wherever he goes and whenever he comes in contact with human beings or animals he may leave a trail of tuberculosis.

In the past, too many physicians have been satisfied to diagnose and treat tuberculosis only after it had reached the consumptive stage. Witness the sanatorium population of this country with from 80 to 90 per cent of patients in the consumptive stage on admission; witness the great volume of literature on treatment dealing largely with drastic procedures, such as extrapleural thoracoplasty; then remember that all these patients at one time had only microscopic lesions, which could be detected solely by the tuberculin test.

Occasionally one hears the statement that the x-ray inspection of the chest is the best method of case finding in tuberculosis; whether one agrees with this statement will depend on one's interpretation of a case of tuberculosis. He who is satisfied to find tuberculosis only when it is entering on or is already in the consumptive stage will be satisfied with this statement, realizing of course the limitations of the x-ray inspection with reference to the small part of the body viewed in this manner and with man's inability to determine etiology from shadows. But he who appreciates the fact that tuberculosis begins in a microscopic way, when it can be detected only by the tuberculin test, and is cognizant of the fact that, even though the lesions are microscopic the individual has tuberculosis, will never be satisfied with anything less delicate than the tuberculin test in the finding of cases of tuberculosis.

It was not until a specific test for tuberculosis in its very beginning became available that man was able to

study truly its epidemiology. When Colonel Bushnell wrote a monograph on the Epidemiology of Tuberculosis twenty years ago he said "The role of the von Pirquet test in the epidemiology of tuberculosis is destined, it is believed, to become of increasing importance. Especial attention has therefore been paid to it in the hope that the Anglo-Saxon may be inspired by the example of the French and of the Germans to make use of it on a large scale—not only in the tropics, but also at home."

THE TUBERCULIN TEST

With our present methods of examination, and particularly with the tuberculin test, the trail which the contagious tuberculous person leaves can be picked up almost as the hound senses the trail of the fox or as the game animal is trailed in the snow.

The tuberculin test is our most valuable epidemiologic agent. When a good quality of tuberculin or purified protein derivative is carefully administered in the proper dosage by the intracutaneous method, it is almost uncanny with what accuracy it determines the presence of tubercle bacilli in the human or animal body. Even while the lesions are microscopic in size, the tuberculin test betrays their presence. Indeed, tubercle bacilli cannot escape detection by this test more than from three to seven weeks after they are lodged in the tissues of the human body. Thus the trail of tuberculosis may be picked up by the tuberculin test while it is fresh or at almost any subsequent time. In most parts of this country, reasonably fresh trails may be discovered through the examination of children in the preschool or school age. It is unusual for a child of any age to be in association with an adult who has contagious tuberculosis without becoming infected and reacting to tuberculin.

When the trail is detected the next step is to follow the child to the home and there administer the tuberculin test to every member of the household. The test is so specific that it rarely misses the patient with clinical tuberculosis except when the disease is so extensive and the patient so near death that the tissues are becoming desensitized through the large amount of tuberculoprotein being manufactured in the body. Usually in such persons the disease is readily detected by other means. All adult reactors in the household should have x-ray film inspections of their chests. Such an inspection with a single film enables one to visualize reasonably well about 75 per cent of the lung. If lesions are present which have become macroscopic and are located in that part of the lung visualized, they will usually cast shadows on the x-ray film. However, these are only shadows and several diseases cast shadows which cannot be differentiated one from the other; therefore the x-ray film inspection is only a screening process; that is, it selects those members of the household who have disease in the lungs which may be tuberculous.

If one or more members are found to have such shadows, the sputum should be studied immediately for acid-fast bacilli. The presence of such bacilli does not constitute a diagnosis; there are several organisms which morphologically cannot be differentiated from the tubercle bacillus. Their staining qualities are identical. Before they were discovered or well understood, laboratorians made diagnoses of tuberculosis on finding acid-fast bacilli in such material as sputum, gastric contents and urine. This is no longer done by the well informed laboratory worker nor does the physician take the laboratory report indicating the presence of acid-fast bacilli without further study. When these are present their pathogenicity must be determined. This is best done by guinea pig inoculation. The old procedure of introducing suspected material into the body of the guinea pig and waiting six weeks for developments is obsolete. Too much time is consumed, during which the person who actually has tuberculosis may spread tubercle bacilli to his associates. A method that requires only two weeks or slightly more consists in inoculating animals which do not react to tuberculin. If pathogenic organisms are in the material inoculated, the animal will react to the tuberculin test in about two weeks.

Another method consists in injecting guinea pigs intracutaneously with suspected material. Within seven to twenty-one days a nodule appears at the site of the injection, from which smears may be made and examined for the presence of acid-fast bacilli. As soon as the inguinal lymph nodes have enlarged on the side of the inoculation, the animal may be killed and the node studied for tubercle bacilli to confirm the earlier observation. Woolsey has found that the average time for a diagnosis in this manner is twenty days.

Pickof injects silica suspension subcutaneously in the flank of the guinea pig and immediately he injects into the same area material suspected of containing tubercle bacilli. The presence of silica apparently stimulates the proliferation of tubercle bacilli and they multiply so rapidly that in some cases within ten to fifteen days material aspirated from this area contains tubercle bacilli in abundance.

Thus, within a brief period after we pick up the trail through the tuberculin reaction of a child we have found the source and have determined the pathogenicity of the organism. This, however, has not been done by slipshod single test methods. It would be most gratifying if any single phase of the examination, such as the x-ray film, would enable us to determine etiology quickly. With the present state of affairs, however, we are rarely able to establish diagnoses on the basis of one phase of the examination. Abrams at one time enjoyed an excellent reputation as an internist but he set himself up as a dictator in diagnosis from a single sample of blood only to fail, as all others must fail who make diagnoses without sufficient evidence.

Failing to find a contagious case of tuberculosis in the immediate household, including the parents, servants and all others who reside there, one should next look to the close relatives, such as the grandparents, aunts and uncles, who frequently are in contact with the child. Since tuberculosis in contagious form often exists in elderly persons, the examination of grandparents may uncover the unsuspected source of infection in the child. In a number of surveys from 1 to 2 per cent of school teachers have been found to have clinical pulmonary tuberculosis. Therefore if the source of the child's infection is not located elsewhere his teachers and other members of the school personnel with whom he has been in contact should be examined. Failing here, the neighbors and close friends of the family may be considered. In following the trail, one may learn that a close associate of the child has died of tuberculosis. With this information the search should not cease, for there may be other cases among the living associates.

Some children become infected with tubercle bacilli through casual contact. Under proper conditions only a minute is required for infection from a contagious case of tuberculosis. Thus at a public meeting place, in a public conveyance, during a brief visit to or from

a distant relative, infection may occur. One picks up the trail through the tuberculin test but it is impossible to follow it. This may be likened to trailing the game bird in the snow or the sand to the point where it takes flight for tens or hundreds of miles.

Another possibility which must never be overlooked is that tuberculosis may exist among the animal associates of the child. The dog, the cat and even the parrot may be eliminating tubercle bacilli which result in infection of the child. In the past, large numbers of children became reactors to tuberculin from bovine tubercle bacilli and even today much of the primary and even clinical tuberculosis in the people of countries that have not controlled tuberculosis among the cattle is due to the bovine type of tubercle bacillus. Therefore in the epidemiologic study one should never overlook the necessary examination of animals who are in contact with the child or whose products the child consumes.

This epidemiologic procedure is not applicable in places where a high percentage of children are infected, indicating the presence of numerous clinical cases of tuberculosis in the community. The trails, as indicated by the tuberculin test, are so numerous, cross one another so frequently and are so superimposed on one another that they may be likened to the trails in the snow of game animals which are abundant. Here they may actually form paths which cross one another in various ways and it is unusual to find a single trail which one can follow to the animal. Where tuberculosis is so prevalent, the only effective procedure is to examine all the adults to find the contagious cases. When these are isolated or treated, an environment is provided in which only a few of the children of the next generation will react to tuberculin. Then the ideal method of trailing tuberculosis with the tuberculin test can be employed. Fortunately, in the greater part of the United States the disease is not so prevalent but that this method is already an effective procedure.

At the Lymanhurst Health Center we operate epidemiologic clinics both for adults and for children. A few persons register in these clinics with symptoms which have caused tuberculosis to be suspected but for the most part the patients are requested to be examined because (1) an adult associate has been found to have contagious tuberculosis or (2) one or more children in a family have been found to react to tuberculin. The examination of the adults consists first of the administration of the tuberculin test. If there is no reaction to a milligram of tuberculin and there is absence of suggestive symptoms, no further phase of the examination is done. Those who react to tuberculin have x-ray film inspections of their chests immediately and, if shadows are found, other phases of the examination, including the laboratory, clinical and even bronchoscopic studies, are made. The whole thought of the examination of such persons is to screen out those who at the moment have tuberculosis which is approaching or is already in the contagious stage in order that they may be treated or isolated. The tuberculin reactors whose chests are clear on all phases of the examination are reexamined annually, as it is well understood that clinical lesions may make their appearance at any time subsequent to the first examination.

The following citations are actual cases and show how effectively tuberculosis can be trailed by administering the tuberculin test among children:

In February 1930 a school girl aged 8 years was found to react to tuberculin. Both her mother and her father were then found to react to the test and x-ray film inspection revealed evidence of disease in the lungs of both. Further examination proved that the father's disease was tuberculous but in the minimal stage, while the mother's disease was tuberculous but in the far advanced stage. Tubercle bacilli were present in her sputum. This family was earning its livelihood by making and selling pies from house to house. Both the father and the mother were admitted to a sanatorium. The father died there in two months of coronary occlusion. The mother died in April 1939 of pneumonia and pulmonary tuberculosis. Thus the disease in this family was permitted to perpetuate itself and no attempts had been made to stop it until it was found in a school child by the tuberculin test.

A boy aged 12 years was found to react to tuberculin in 1931, The family refused examination until 1934, when the father was found to have advanced pulmonary tuberculosis with tubercle bacilli in the sputum. He was immediately admitted to a sanatorium in April 1934 and died there in December of the same year. A sister was also found to have minimal pulmonary tuberculosis in 1934 and was admitted to a sanatorium. She was discharged in 1937 but was readmitted in 1939 with far advanced disease. One brother and two sisters of this boy and the mother were examined in 1934, all of whom were found to have the first infection type of tuberculosis. Another brother had only an x-ray inspection of his chest, which revealed no evidence of disease. Unfortunately the tuberculin test was not administered and therefore we do not know whether he had the first infection type of tuberculosis.

This family emphasizes the importance of making a provision whereby the private physician and the health officer can promptly follow the trail of tuberculosis rather than have to resort to persuasion, which may require months and even years and may never be successful. The health officer must be permitted to seek out the contagious foci of tubercle bacilli regardless of whose body is concealing them. These foci may be likened to dangerous criminals, for they kill by an insidious method just as surely as the criminals kill by an immediate method. As long as the Federal Bureau of Investigation could not follow certain criminals into any part of the United States but must give up pursuit at state lines, it was difficult to apprehend them. Now that the pursuit can be carried into any part of the nation, the criminal rarely escapes. It even became necessary to prosecute those who concealed criminals knowingly or unknowingly. In some cases this may become necessary for those who conceal contagious tuberculous lesions after educational measures have failed. Indeed, already measures are being provided and enforced to compel the incorrigible person with contagious tuberculosis to be isolated as long as the disease is contagious. In some places special buildings are being contemplated for such persons, where they can be kept under lock and key. This is absolutely essential for every state where incorrigible tuberculous persons exist.

We did not hesitate to isolate "Typhoid Mary" for the last twenty-three years of her life because she left a trail of typhoid wherever she associated with other persons. From the standpoint of contagion, tuberculosis does not differ from typhoid.

We have traced the disease to grandparents and other relatives, to domestics, to teachers and to neighbors of children who reacted to the tuberculin test. In fact, in one group of twenty-five who had only the first infection type of tuberculosis a total of fifty-six contacts were examined, among whom thirty-two were found to have the reinfection type of tuberculosis and the remaining twenty-four had the first infection type of the disease.

In recent years tuberculin has been used extensively to test students on admission to schools of nursing and

medicine. The trail may be followed to the source of some of the reactors. Those who do not react have the test repeated periodically as long as they are nonreactors. While in school, many become reactors; when one takes up this trail, as pioneers in the field, as particularly Diehl and Boynton have done, it usually leads to a tuberculous patient whom the student has examined, nursed or treated. Thus a potent source of infection among hospital personnel was trailed down by the tuberculin test and a great international movement is under way to overcome it.

There is nothing in the entire field of epidemiologic medicine more fascinating than picking up the trail of tuberculosis by the tuberculin test and following to its headquarters in the body of a man or woman. As the criminal leaves traces which lead to his identity and capture, so does tuberculosis leave traces which lead to its discovery. Here one makes a capture of inestimable value to the victim and his associates. In cities and states where tuberculosis is no longer universal among the citizens, all tuberculin reactors (particularly children and young adults) should be reported by physicians to the health department. The modern health officer is interested in epidemiology and because of the nature of his position and trained personnel at his disposal he can take up the trail with the private physician more gracefully and effectively than anyone else in the community.

OTHER METHODS

Since the ideal epidemiologic procedure as described has recently been developed, it has not been in use sufficiently long to bear its best fruit in large volume. Therefore we are compelled still to use old methods which are far less satisfactory but yet are of great value. One of these methods consists in beginning with the infant who has mild or severe manifestations of disease which are called to the attention of the physician before the tuberculin test is administered but complete examination proves that tuberculosis is present. For example:

An infant aged approximately 13 months was found to have the first infection type of tuberculosis in the pneumonic stage. The symptoms were mild but sufficient to call a physician. This child had few adult contacts. The mother and father were found to react to tuberculin but no clinical lesions could be located. One uncle, who had been in contact with the child, reacted to tuberculin but no clinical lesions were detected. A grandmother with whom the infant had lived for a short time and who had fondled him on many occasions resisted the idea of examination because she considered it impossible for any one over 40 years of age to have tuberculosis. However, she had been known to complain of fatigue, dyspnea, anorexia and loss of weight. In about one month after the infant's condition was detected, the grandmother permitted the administration of a tuberculin test, which resulted in a reaction. Following this she made numerous excuses and the x-ray inspection of her chest was delayed for approximately two months. This revealed evidence of disease but another month was lost before she could "remember" to collect a specimen of sputum for examination. This was found to be teeming with pathogenic acid-fast bacilli.

An infant aged 6 months with serious illness was admitted to one of our hospitals in April 1934. His disease proved to be generalized miliary tuberculosis, which was fatal in a short time. Examination of the adult contacts disclosed that the mother had tuberculous lesions in the left lung, and tubercle bacilli were recovered from her sputum.

On June 16, 1935, an apparently healthy infant was born in a small hospital. The nurse in charge of the obstetric and pediatric service gave him the necessary care the first two days of life. He remained in good health until he was 6 weeks old, when he began to cough and had fever. At the age of 8 weeks he died of generalized miliary tuberculosis. An examination of all his adult contacts revealed no case of clinical tuberculosis except the nurse who cared for him for only two days. She was found to have extensive disease with an abundance of pathogenic acid-fast bacilli in her sputum. The case was tried in the courts and the hospital was required to pay $1,500 to the family of the infant. The verdict of the jury was upheld by the state supreme court.

Usually the child with tuberculous meningitis or generalized miliary disease is not contagious; therefore it is purely a matter of seeking the source in order to isolate or treat so as to prevent others from becoming infected.

Another epidemiologic procedure consists in beginning with adults who are found to have contagious tuberculosis. Such persons may be found because of (1) declining general health, (2) recent sudden developments such as excruciating pain in the chest or hemorrhage, (3) suspicion of the disease by neighbors or relatives, (4) detection of lesions previously unsuspected during a survey, (5) lesions discovered accidentally while examination is being made for other reasons, such as subsequent to an accident or for life insurance.

This procedure really amounts to back trailing; that is, we examine the persons with whom the recently discovered patient has been in contact and where cultures of tubercle bacilli may have been established. Here one finds the disease in various stages of its development, depending somewhat on the interval of time that has elapsed since the contact which each person had with the patient. The majority of definite contacts will be found to have the first infection type of tuberculosis, as manifested by the tuberculin test. On first examination a few of the adult reactors, perhaps 1 per cent or less, will have evidence of clinical lesions in their lungs or elsewhere; some may already have the disease in the contagious stage. They may or may not have had any significant symptoms. The remainder of the tuberculin reactors will have no evidence of clinical disease that can be detected in the living body by any phase of the examination. Nevertheless each of them has potential clinical tuberculosis and therefore should be adequately examined at least once a year. Among them there may occasionally appear such acute conditions as tuberculous meningitis, generalized miliary disease, tuberculous pneumonia and pleurisy with effusion. These may develop almost over night and the physician can never foresee their coming nor is there anything he can do to prevent them. They constitute a situation that at present is inevitable and unavoidable among persons infected with tubercle bacilli. The more usual development, however, is the chronic form of tuberculosis, which may appear in one or more parts of the body. We watch for it in the lungs not only because we have better methods of examining them than other internal organs but also because it is so likely to become contagious. It rarely occurs during the period of childhood; therefore our observations among reactors can be limited almost entirely to adults. The fact that there is no evidence of clinical disease revealed in the chest of tuberculin reactors today is no guaranty that it will not be present at any subsequent time. Indeed, there is no time limit; that is, one cannot say that after a period of five years there is no need for further examinations of tuberculin reactors; they must be continued as long as the individual reacts to tuberculin.

On Jan. 23, 1934, a girl aged 19 years reported to her physician because of illness. He found evidence of advanced pulmonary tuberculosis in the left lung, which was in the contagious stage. In back trailing, the tuberculin test revealed the presence of the first infection type of tuberculosis in the

bodies of each of her three sisters. The x-ray films of the chests of two of the sisters aged 17 and 18 years revealed no evidence of disease. However, one year later each of them had unmistakable pulmonary tuberculosis of the reinfection type, which was detected in the presymptom and the precontagious stage.

In the four years 1936-1939, 466 tuberculosis suspects were reported to the Minneapolis Health Department through complaints of relatives or neighbors. Examination of these suspected persons revealed 114 previously unknown cases of the reinfection clinical type of tuberculosis.

In 1934 we reported seventeen tuberculous patients representing the same number of families. They were picked at random and there was a total of 102 persons in these seventeen families. Investigation revealed that forty-two had the reinfection clinical type of tuberculosis, which had already reached the symptom stage:

From the time their illness began until June 15, 1933, the total illness amounted to 1,836 months, or 153 years. Out of the forty-two with the reinfection type of disease twenty-nine were sent to sanatoriums and until June 15, 1933, they had spent 674 months, or more than fifty-six years, mostly in tax-supported institutions. The very conservative cost in our tax-supported institutions is $84 a month per patient. Thus, taxation has already paid more than $56,000 for twenty-nine members of seventeen families who were hospitalized. This leaves 1,162 months, or approximately ninety-seven years, of illness spent in homes. Twelve of the forty-two patients with the reinfection type of tuberculosis have already died. In addition to the cases of the reinfection type of disease there were thirty-one cases of the first infection type. Two of the 102 members of the seventeen families refused examination. Thus, of 100 examined, seventy-three were contaminated with tubercle bacilli. In addition there was one case of tuberculosis of the bones and joints. Inasmuch as the thirty-one who are apparently well but have the first infection type of disease are potential reinfection types, it is obvious that since most of them are children some will later fall ill of the reinfection type. While the number of cases, the total duration of illness, total hospitalization and the number of deaths are great, they are insignificant when compared with the dissemination of tubercle bacilli by the forty-two reinfection types of cases to their associates. The thirty-one in their own families doubtless represent a very small percentage of the total number they have infected. Thus, they have started all over again the vicious cycle of tuberculosis and the next generation will reap much of the harvest.

Thus, epidemiologic work carefully practiced is capable of bringing to light numerous cases of tuberculosis in its various phases of development. For example, in the Minneapolis Health Department in 1936, 916 cases of first infection type of tuberculosis (83 per cent of all such cases reported that year) were brought to light through the work of the epidemiologists. The same year, 162 persons with reinfection clinical types of tuberculosis (21 per cent of all such cases reported that year) were detected as a result of epidemiologic studies. In 1937, 59 per cent of the first infection type and 29 per cent of all reinfections or clinical types of tuberculosis cases reported to the health department were due to the epidemiologic work. In 1938 this was true in 52 per cent of first infection and 24 per cent of reinfection, while in 1939 it was 64 per cent of first infections and 30 per cent of reinfection clinical cases. Thus, approximately two thirds of all the cases of the first infection type of tuberculosis and one fourth of all with clinical tuberculosis were brought to light through the efforts of the epidemiologists. If the time arrives when no obstruction is offered to the activities of the epidemiologist, all cases of tuberculosis will be detected promptly, regardless of the phase of its development. However, this accomplishment is dependent on the medical profession of the United States, whose members must make all the necessary examinations, decide on the final diagnoses, administer treatment and provide medical care for all who are isolated because of contagious disease.

IMPORTANCE OF ROENTGENOGRAPHING OUR ARMED FORCES

Since the close of the World War, the government has paid out about a thousand million dollars in compensation to veterans for tuberculosis, exclusive of hospitalization costs.

Hospitalization in the twelve veterans tuberculosis sanatoriums cost $6,400,000 for the year 1939. Multiplying that by 22 gives the tidy sum of $140,800,000.

The admissions to veterans hospitals for tuberculosis in 1938 numbered 19,989, and there were seventy-two more cases of tuberculosis in the government hospitals in 1938 than there were in 1937. The load is still increasing, twenty-two years after the armistice.

There were 1,979 deaths from tuberculosis in 1938, which was 19.56 per cent of the deaths from all causes.

From 1928 to 1932, a five year period, 28,497 Veterans Administration patients died in all hospitals from all causes. Of these 12,113, or 41 per cent, died of tuberculosis of all types.

Between 1924 and 1932, 61,330 veterans occupied hospital beds maintained by the government on account of tuberculosis. Two and one-fourth army divisions occupied beds because of tuberculosis.

THE DIAGNOSIS OF TUBERCULOSIS

ESPECIALLY OF PULMONARY TUBERCULOSIS

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The diagnosis of tuberculosis, and especially of pulmonary tuberculosis, is one of the most important problems the physician has to deal with. He should endeavor to find out not only the presence or absence of tuberculosis but, if present, whether it is active, because if active it needs treatment. It should be studied in a systematic way and, if necessary, no method should be omitted to attain a successful result. A careful and thorough history should always be taken. Sometimes from the history alone one will obtain an important lead. The history should be the first method of procedure and, in the taking of it, one should try to obtain the approximate date and manner of onset. Certain pertinent questions should be asked of the patient. For instance, he should be asked whether he has ever had a recent or past pleurisy, either dry or with effusion. He should also be asked whether he has ever had definite spitting of blood from the lungs, either recent or in the past; also with regard to a prolonged cough or prolonged bronchitis, either at present or in the past; also with regard to irritability, weakness, chills and fever, loss of weight, flushing of the face and a localized wheeze in the chest, particularly at the apex of the lung. The family history and present and previous occupations are important, and one can sometimes obtain from them a history of contact. A history

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of contact is of great value, especially with medical students and nurses who are on service in the tuberculosis wards of hospitals; also with those members of families who have been exposed to cases of open tuberculosis. These are only some of the outstanding things to look for in taking a history.

X-RAY EXAMINATION

The examination by x-rays is the most important means at our disposal to diagnose lung tuberculosis and particularly active lung tuberculosis. If possible stereoscopic films should always be made. When the physician is in doubt as to whether he is dealing with tuberculosis or whether the tuberculosis is merely latent and therefore not demanding treatment, or whether it is active, he should get the advice of a competent x-ray man. It should not usually be difficult for the competent x-ray specialist to diagnose lung tuberculosis and to tell whether it is merely latent or active. His knowledge of the character and location of the shadows in the lungs often makes it an easy matter for him to diagnose an active lung phthisis.

One should not wait for the development of clinical pulmonary tuberculosis before attempting to diagnose it but should try to discover which individuals have definite evidence of disease in the lungs. An attempt should then be made to direct the lives of these persons so that the disease, not discovered by physical signs but by the x-ray films, may not progress. Brown and Sampson [1] state that, if by the age of 25 there are no parenchymatous changes in the lung suggestive of pulmonary phthisis, only in rare instances, and then usually only when subjected to repeated and continuous infection, will the individual develop pulmonary tuberculosis. As physical examination usually fails to detect early lesions in these young persons, these authors suggest that no child should leave school, and particularly high school, without an x-ray examination of the chest. This x-ray examination would probably reveal most of those persons who during the second, third and fourth decades of life are liable to break down with clinical pulmonary tuberculosis. These authors made an x-ray study of all the school children of Saranac Lake over a period of seven years, numbering more than 4,000. Of these 4,000 children seventy-nine, less than 2 per cent, showed a parenchymal lesion by x-ray examination and were given a physical examination. Only seven had definite physical signs.

For years it was commonly accepted that the usual site of beginning pulmonary tuberculosis was at the very top of the lung. The reason for this was that slight changes in breathing (roughened breathing, prolonged expiration) and possibly a slight increase in the vocal resonance, together with some more or less change in percussion, occurred at the apex in some patients who later developed a fatal pulmonary tuberculosis. X-ray examination, however, showed that the usual site of beginning clinical lung tuberculosis was in the upper lobe below the clavicle and that these slight changes were due to lesions—in some cases deep seated, in others healed—or to no definitely determined pathologic changes.

Brown and Sampson reported their observations on 280 patients with minimal pulmonary tuberculosis. This group includes all those with the slightest but still sufficient evidence on which to base a diagnosis of beginning pulmonary phthisis. Some years ago the staff at Trudeau Sanatorium concluded that moderately coarse moist rales at an apex were the only reliable data obtained on physical examination. In these 280 patients moderately coarse moist rales were present in 27 per cent, while a definite parenchymatous x-ray lesion was found in more than 99 per cent. Hemoptysis was as frequent as rales (26 per cent), while pleuritic effusion occurred in 12 per cent. Tubercle bacilli in the sputum were found in 35 per cent. It is thus seen that in this group of 280 patients with minimal lung tuberculosis 277 had definite x-ray evidence of pulmonary phthisis and only seventy-six presented definite evidence by physical signs. This is striking evidence of the superiority of the x-ray over the physical examination in the diagnosis of lung tuberculosis.

In another study to compare the relative values of physical signs and x-ray observations, also reported by Sampson and Brown,[1] 1,004 consecutive patients were examined in Trudeau Sanatorium. All patients with definite physical signs had also x-ray evidence of disease. In nineteen (1.89 per cent) the physical signs gave a greater extent of the disease than the x-ray. In 211 (21.01 per cent) the extent of disease was the same by the two methods. In 361 patients (35.95 per cent) the x-ray examination showed more disease than physical signs. In 396 patients (39.44 per cent) the x-ray examination showed definite lung tuberculosis, and the physical signs were practically normal. In this group of 1,004 patients a cavity was present by x-ray examination in 392 persons (39.04 per cent) while fifty-eight patients had evidence of a cavity by physical signs (5.77 per cent). Here also the x-ray examination was much more accurate.

In a study which Sampson and Brown made on 1,367 patients diagnosed as having pulmonary tuberculosis, a comparison of the physical and x-ray examinations showed that while 68.5 per cent of them had rales at an apex more than 99 per cent had definite x-ray changes. In this group of 1,367 patients tubercle bacilli occurred in 61.5 per cent, hemoptysis in 33.5 per cent and pleural effusion in 12 per cent.

There are still those who are skeptical of the great value of the x-rays to diagnose lung tuberculosis. To meet this skepticism the late Lawrason Brown studied 503 patients at Trudeau Sanatorium whose lungs gave only indefinite or no physical signs. X-ray examination of these showed pulmonary tuberculosis, and sooner or later more than 84 per cent presented clearcut clinical signs of disease.

Let us now look at the other side of the picture, that is, what happened to those patients whose x-ray films showed no evidence of a parenchymatous change interpreted as tuberculous. Several studies were made by Drs. Lawrason Brown and Fred H. Heise at Trudeau Sanatorium to determine this. In 264 patients in whom none of the five cardinal diagnostic criteria were present, followed after one to seven years, only two developed lung tuberculosis. At the time of examination one of these had tuberculous cervical adenitis and the other had a carious rib. Another study of 2,600 consecutive patients showed 298 with negative x-ray examinations, and of these 298 patients only two developed tuberculosis and died of the disease.[2]

Another study was made on 312 patients who had no definite x-ray evidence of tuberculosis, but each patient had one or more of the other four cardinal

1. Sampson, Homer L., and Brown, Lawrason: Correlation of Clinical and Roentgenological Observations in Pulmonary Tuberculosis, Radiology 22: 1-14 (Jan.) 1934.

2. The five cardinal diagnostic criteria are tubercle bacilli, moderately coarse moist rales above the third rib and third dorsal spine, a parenchymatous x-ray lesion in the same area, hemoptysis, and pleurisy with effusion.

diagnostic criteria. Fifty-nine were said to have had tubercle bacilli in the sputum at some time, often before admission to Trudeau Sanatorium; eighty-one patients had rales at the apex, sixty-eight rales at the base, seventy-six hemoptysis and twenty-eight pleural effusion. Of these 312 patients only two died, one of whom had been reported as having had tubercle bacilli in the sputum, the other as having had hemoptysis.

In a study at Trudeau Sanatorium of 1,000 patients, Heise and Brown found that rales lose in diagnostic significance as they occur in isolated areas from the upper third of the lung downward. Moderately coarse moist rales in the upper third of the lung are associated with a positive x-ray examination in 98 per cent and fine moist rales in the same location in 80 per cent. In 20 per cent of the patients in this group with positive x-ray examinations, no rales were heard.

The evidence of a parenchymal lesion in those cases in which tubercle bacilli were present in the sputum was 99.2 per cent, rales in the apex 99.3 per cent, hemoptysis 96 per cent and pleurisy with effusion 98.5 per cent.

While the evidence submitted emphatically points to the x-ray examination of the lungs as being by far the best means to diagnose pulmonary tuberculosis, a thorough physical examination of the chest should never be omitted. All physicians should try to become experts in physical examination and particularly in the interpretation of rales, because there are occasions when it is not possible to obtain an x-ray examination; moreover, one often sees faulty films and faulty interpretation. These two methods, x-ray and physical examination, should always be employed.

CAVITATION

The presence of cavitation in the lung is of great assistance in diagnosing pulmonary tuberculosis. Cavitation is not confined solely to lung tuberculosis, as there are other diseases that can produce it; for instance, cancer of the lung, mycotic infections and certain forms of silicosis. It is, however, more frequent in pulmonary tuberculosis than in any other disease. For many years patients with cavities detected by physical examination were not admitted to Trudeau Sanatorium. Now, however, over 40 per cent of the patients have cavities when studied by x-ray examination. In a series of 392 consecutive patients with cavities, as shown by x-ray examination, in only 15 per cent were there any physical signs even suggestive of cavitation. In a more recent study of 500 patients with cavities the classic physical signs of cavitation were present in only 5 per cent.[3] The detection of cavities by physical examination depends on the size and location of the cavity and the increased density of the lung between the cavity and the chest wall. If the bronchus draining the cavity is closed by secretion or by twisting or stenosis, the cavity may be silent. There are also suggestive signs of cavitation, such as bronchovesicular breathing, harsh inspiration with coarse moist rales over a limited area below the second rib. Coarse moist rales alone in the upper third of the lung are always suggestive of cavitation. Its presence, however, can be determined with certainty only by an x-ray examination. When the trachea is drawn markedly to one side, signs of cavitation frequently occur in the inner first interspace. This error can best be avoided by x-ray examination.

Within the past two or three years the diagnosis or detection of pulmonary cavities has occasionally been made easier by the procedure spoken of as "planigraphy" or "tomography." This is a method of taking specific layers of tissue, which, as stated, sometimes reveals the cavities more clearly than they are revealed by the usual methods, more particularly single films.

The value of this procedure, however, is still controversial. Suffice it to say that it is worth using when doubt exists; in fact, at times it reveals apparently cavity formation where it has not been suspected. The method, however, has inherent defects or would have to be used only in conjunction with specific films.

The vast majority of all pulmonary cavities are "silent" and some are not visible. Many cavities develop when the patient is improving symptomatically and such cavities may remain silent for months.

EARLY X-RAY EVIDENCES OF PULMONARY TUBERCULOSIS

What are the early x-ray evidences of pulmonary tuberculosis?

Do changes on the x-ray film of the lung precede those detected by the usual physical examination? Some physicians still believe that a careful physical examination is superior or at least equal to an x-ray examination of the chest. Both methods should always be part of a thorough routine examination. Even if the physician is expert in physical examination and even if both methods are at his disposal, I place the x-ray examination as by far the more important one. It is the sense of sight against the sense of hearing. No patient has been completely examined until there has also been made an x-ray film of his chest, always in stereo if possible. Thus an examination of the chest should now consist of inspection, palpation, percussion, auscultation and x-ray examination. In order not to be biased by the x-ray examination it is advisable to make the physical examination first and then to read the x-ray films. In answer to the question as stated, one can say that in a large number of cases definite changes characteristic of tuberculosis occur in an x-ray film long before definite evidence of abnormal physical signs can be detected.

Changes on films of the lungs in reference to tuberculosis may be stated as negative, doubtful, suggestive or characteristic but not as pathognomonic. While all the data that can be obtained from the x-ray film, such as age, sex, location and character of the shadow, should be considered in diagnosis, yet I am always suspicious of moderately coarse and fine mottling, irregularly distributed in any portion of the lung. By mottling I mean a spotted appearance. Tuberculosis can produce changes other than such mottling which are often impossible to distinguish from those due to other conditions. When such mottling, however, occurs in the upper third of the chest, I regard it as characteristic of tuberculosis, which must always be kept in mind until disproved, even though physical signs are normal. Of 1,367 consecutive cases at Trudeau Sanatorium (a sanatorium solely for pulmonary tuberculosis) 32 per cent had either no abnormal physical signs or such slight ones that the diagnosis was made entirely or in large part from the x-ray film.[4] Of 1,004 cases in private practice in Saranac Lake 148, or 15 per cent, of such cases occurred.

3. The classic physical signs indicative of cavity include tympanitic or cracked pot note, markedly increased vocal resonance (intense bronchophony, pectoriloquy), amphoric or bronchial breathing and coarse, consonating, metallic, bubbling rales.

4. Sampson, Homer L., and Brown, Lawrason: The Value of the Roentgenologic Examination in Pulmonary Tuberculosis, Am. J. Roentgenol. **25**: 209-219 (Feb.) 1931.

Another important question is How early in the course of tuberculosis of the lungs can definite changes be detected? The earliest changes in pulmonary tuberculosis may escape observation on account of their location or of their slight density. An absence of change is unusual, for in less than 1 per cent are parenchymatous changes lacking when tubercle bacilli occur in the sputum. In the last 500 patients in Trudeau Sanatorium (ending September 1930) parenchymatous changes were always seen in the x-ray film when tubercle bacilli were present in the sputum.

The relation of the time a patient has an x-ray examination of the chest with regard to the time of onset of the disease varies greatly. In most cases the discovery of abnormal physical signs causes the film of the chest to be taken. In a constantly increasing number of instances routine physical examinations are supplemented by x-ray films. Homer L. Sampson and the late Dr. Lawrason Brown were strongly of the view that any patient who presents only peritruncal or no changes by x-ray examination at the age of 25 has slight chances of developing active pulmonary tuberculosis later in life. The routine examination of large numbers of school children led them to believe that definite x-ray evidence of pulmonary tuberculosis may exist for years before symptoms arise sufficient to focus attention to the lungs and that symptoms often precede the appearance of abnormal physical signs.

These observers (Sampson and Brown) attempted to determine how soon tubercles appear on the films of rabbits with a miliary tuberculosis and saw definite tubercles on the films thirteen days after inoculation. When the lungs were removed from the thorax and inflated to the normal size, the tubercles stood out clearly. In most instances the first manifestations that are seen in the lung films after puberty are accompanied by considerable collateral inflammation because the individual is more or less allergic. The deposit in the lungs of a few scattered tubercle bacilli may lead to scattered mottling of slight extent. If many tubercle bacilli are deposited, miliary pulmonary tuberculosis may develop. A condition between these extremes is the usual thing. This may lead to infiltration, mottling in the upper third of the lung or to a more intense exudative focus in the same area, the so-called subclavicular infiltration. This type of infiltration is diagnosed only from the film and the sputum. Occasionally tuberculous lesions are discovered on the film where a week or ten days previously they did not exist. Sampson and Brown report one instance in which a focus manifested itself within forty-eight hours. Such exudative lesions would be more commonly discovered if films were taken more frequently and at shorter intervals.

Since it is fairly well established that small areas of disease can be shown on good stereograms, it is necessary to attempt to standardize the impressions as to the character of the shadows seen in pulmonary tuberculosis. Certain important points, however, should be remembered. First, that a final diagnosis should not be made until all data are assembled or until sufficient evidence is available. Second, that disease in the lung is characterized by differences in densities on the film or screen, and the most important change is that of tissue density.

One cannot say that there are pathognomonic shadows of pulmonary tuberculosis, because other pulmonary diseases produce shadows that are similar. However, one constantly hears such expressions as "This looks like tuberculosis," referring to a mottling confined to the upper half of the lung field, or "That is a neoplasm," referring to the heavy shadows in the root or mediastinal regions. Though one cannot say that tuberculosis or any other pulmonary disease has pathognomonic shadows, one can make certain differentiations which are reliable. The interpretation of films will always remain a matter of personal equation or judgment, and a final diagnosis will continue to be empirical; that is to say, founded on experience. The final diagnosis should be made only after the data are assembled. When one person is accustomed in a large tuberculosis sanatorium to read from thirty to forty films a day, is able to correlate all other facts connected with each film and is able to follow the films throughout the patient's stay in the sanatorium, he gains a wonderful knowledge of chest films. There will, however, always be a few films in which all signs fail. Mottling, when found above the hilus of the lung, will be found to be due to tuberculosis more often than otherwise. When the mottling is associated with circumscribed areas of rarefaction or annular shadows, or with stringlike shadows of fibrosis, the diagnosis of pulmonary tuberculosis is further strengthened. The same shadow complexes found elsewhere in the lung, with the apexes free, lessen the probability of tuberculosis. Yet characteristic mottling at the base is often due to tuberculosis.

The five cardinal diagnostic data of tuberculosis in 1,367 cases diagnosed pulmonary tuberculosis from 1,478 consecutive cases in Trudeau Sanatorium were tubercle bacilli 61.5 per cent, rales 68.5 per cent, x-ray examination 99 per cent, hemoptysis 33.5 per cent and pleurisy 12 per cent. It is thus seen that the x-ray examination is by far the best means available with which to diagnose pulmonary tuberculosis. The physical examination of the chest comes second and the laboratory examination third in importance. The importance of the x-ray examination does not cease when the diagnosis of pulmonary tuberculosis is made. It now takes on a new role: that of recording the changes that may take place in the existing foci or in the development of new areas of disease. The x-ray film now enters the field of treatment or prognosis. Frequent films should now be made, always in stereo, never at intervals greater than two months and usually in from four to six weeks.

The serial x-ray film is the most reliable method of following the course of the disease, and a progressing lesion is frequently seen a considerable time before symptoms appear. Symptoms or an increase of symptoms due to a relapse of pulmonary tuberculosis may precede by several weeks changes in physical signs. At Trudeau Sanatorium 40 per cent or more of all patients admitted have cavities as shown by x-ray examination. It is important in treatment to detect the development of cavities, and this is done almost entirely on the evidence of the x-ray film. The detection also of small and even large cavities is often determined only by the film. We frequently see patients in whom the physical examination gives no suspicion of cavitation and yet the x-ray film shows well defined and sometimes large cavitation.

THE DETERMINATION OF CLINICAL ACTIVITY IN PULMONARY TUBERCULOSIS BY X-RAY EXAMINATION

Ornstein and Sampson [5] attempted to interpret x-ray observations in lung tuberculosis not only with regard

5. Ornstein, George G., and Sampson, Homer L.: The Determination of Clinical Activity in Pulmonary Tuberculosis from Roentgenograms, Am. Rev. Tuberc. 5: 842 (Dec.) 1921.

to the extent of the disease but also as to whether the character of the lesion might be associated with the symptom complex observed. Activity in pulmonary tuberculosis is usually limited to the symptoms and physical signs of the patient. Attempts to determine activity by complement fixation, tuberculin, auto-urine inoculation, chemical urine reactions and sputum analysis have been unsatisfactory. Many physicians base clinical activity on temperature and pulse. For instance, the case is called active when the pulse and temperature for more than three of seven consecutive days is above a rate of 90 for the pulse and 99 F. for a male, and above a rate of 96 for the pulse and 99.6 F. for a female.

Interpretation of shadows in x-ray films should be associated with the underlying pathologic process. Tubercles may occur in various stages—from early formation in which the tubercles are not walled off to the later stages in which they are fibrous and calcified (walled off tubercles). Shadows cast by tubercles vary almost directly in proportion to their density. Shadows cast by new tubercles are nebulous in character, that is, cloudy, hazy or misty, and their margins appear to shade into the adjoining parenchyma. A more opaque appearance with sharper margins of the shadows occurs with the fibrous and calcified tubercles.

Pulmonary changes produced by advance or retrogression, and by final healing of pulmonary tuberculosis, produce certain shadows on the x-ray film which may be differentiated. Pathologically active tuberculosis differs from the healed tubercle or the resulting scar tissue. In the active case one sees an entirely different picture from that seen in the healed case. In the former one usually sees a combination of various shadow manifestations. Let us examine a small field in the active process. I assume that there is no scar tissue or calcification in this small area. Here one sees mottling, i. e. spots or blotches, with ill defined margins, or a "cotton ball" appearance, blending gradually with the surrounding lung tissue, which appears hazy and cloudy. When this picture is seen on the x-ray film, one can be reasonably sure that both pathologic and clinical activity are occurring.

Let us assume that this cottony appearance indicates activity. As the disease retrogresses the lung tissue surrounding the cotton ball appears to become better aerated and at the same time one realizes that the cotton ball is smaller and more compact. Or one may see the "cotton balls" (usually the small ones) almost fade from view, leaving a more or less finely dotted appearance or little stringlike shadows. As the patient continues to do well, the mottling loses still more of its collateral haziness; the "cotton balls" become more compact and their appearance more discrete, and the rays pass through areas that were previously hazy. The picture is that of a better aerated lung. Usually further retrogressive changes occur in this group, and the case becomes clinically inactive.

There is another group of patients in which the films show a preponderance of stringlike or wiry shadows, or dense discrete mottling. In this group further retrogressive change is hardly possible, and these cases can be looked on as probably healed tuberculosis.

From this x-ray evidence of these pathologic changes, unless there is occurrence of new tubercle formation demonstrable on the film, even in the presence of extensive disease, one may conclude that, at the time of the reading, clinical activity is absent.

The following is a brief summary of their work:

1. Activity is indicated in the x-ray film by (1) mottling with decidedly ill defined margins, blending gradually with the surrounding lung tissue, which appears hazy and cloudy (nonwalled off tubercles) and (2) the presence of spontaneous and localized pneumothoraces.

2. The amount of activity is dependent on the area of surface drained by the circulation (coalesced or disseminated tubercles).

3. Diminished activity runs parallel to the amount of fibrosis and calcification that has taken place.

One sometimes sees an increase in the physical signs with a very definite improvement in the clinical condition of the patient. This should make one question the reliability of increasing physical signs as evidence of an advance of the disease. This problem can be solved by an x-ray film. A comparison of physical signs and the x-ray film will frequently show that in such conditions there is frequently a decrease of the lung shadows; that is, a decrease of the pathologic process. Sometimes the physical signs may remain the same while the x-ray evidence of disease may show a definite increase. There are also cases in which the x-ray examination shows definite tuberculous infiltration of an apex with tubercle bacilli in sputum but the physical examination does not elicit rales. Later on rales may develop at the apex but the x-ray film may show marked clearing.

When one examines a single set of stereo x-ray films one has a difficult task in trying to determine activity. Here the personal equation enters largely. A fair estimate may usually be made after practice with good rapidly exposed stereoscopic films. Certain shadows with ill defined borders suggest activity, while those with clearcut borders indicate an inactive condition. Sampson and Brown [1] attempted to correlate these interpretations with what happened to 1,024 consecutive patients during their residence in Trudeau Sanatorium. From the x-ray film, 424 cases were classified as active, 40.5 per cent. Of these 424 cases 63.3 per cent showed progression of disease in subsequent x-ray films or artificial pneumothorax was given. No attempt was made to determine activity from the physical signs, but 294 (30 per cent) were regarded symptomatically as active, and of these 52 per cent later showed a definite advance of the disease. Of 125 cases in which a relapse later occurred, 88 per cent had been diagnosed as active by x-ray examination, 45 per cent from symptoms.

EXTENT OF THE LESION

The x-ray examination can usually be relied on to show the extent of the tuberculous disease and it frequently reveals more disease than can be elicited by physical examination. In many cases it also reveals foci which would otherwise be overlooked. Sometimes the reverse occurs: physical signs are heard where no disease is seen on the films. The latter condition often happens as disease goes to arrest. The x-ray shadows may then disappear from below up toward the apex but rales persist over these areas. In other instances in which physical signs are more extensive than x-ray evidence, one must be sure that one is not also dealing with a mixed infection in the lung due to an associated bronchiectasis or drainage into the lung from a chronic sinus condition. One can thus say that this occurs more often with nontuberculous than with tuberculous conditions.

When one has determined that tuberculous disease is present in a lung, one must then state the extent of the disease and from physical signs and symptoms classify

the extent into stages or groups. There are a first, second and third stage.

For many years symptoms and physical signs were alone used as a basis for these divisions. When the x-rays came to be used so much more in diagnosing chest conditions they finally supplanted physical signs and symptoms. It is now advisable to classify entirely on the extent and intensity of the disease as revealed by the x-ray examination. One can now speak of lung conditions as nontuberculous, suspicious, minimal, moderately advanced and far advanced. Thus to describe the extent of the disease we now use x-ray interpretation in place of physical examination.

EVOLUTION OF THE DISEASE

The stereoscopic film is the most reliable means by which to observe progression or retrogression of pulmonary tuberculosis. I believe also that it is a reasonably reliable method to determine the activity of a process. However, in any specific case one cannot be absolutely certain with regard to the presence of activity; disagreement exists with regard to the value of the x-ray examination over this matter. Some believe that the disease can progress or retrogress and that these changes need not necessarily be seen in the film. In a series of cases which Sampson and Brown studied they found that the stereoscopic films gave valuable information with regard to the status of the disease, and that they often gave evidence of activity which otherwise was not suspected. In this respect one must remember several factors. First, in extensive disease where many shadows are present, small though definite changes may occur and pass unrecognized. Second, it is quite common to observe increases in the film interpreted (1) as new disease or (2) as reactivation of previously existing foci when there is no increase of symptoms to correspond to this finding. These new areas or increases in the previously existing shadows usually have characteristic borders. As a rule they are ill defined and the extreme margins do not usually have any hint at demarcation. As most shadows grow older they usually become denser in the control field and the margins become clearcut and show abrupt differences in density as compared with the surrounding lung field. Older shadows appear less confluent, like tapioca drying out. This determination is easy with serial roentgenograms and a revolving stereoscope, with which it is possible to compare minute and corresponding areas on the serial films. It is another matter to do this from a single set of films, and yet with practice it can be done with a fair degree of accuracy. As proof of this Sampson and Brown made a study of 373 cases at Trudeau Sanatorium to compare the relative value of the presence of activity on admission by clinical means and by x-ray examination. The results were evaluated by comparing the course of the disease while in the institution. Clinical activity was based on a study of the patient during the first week in the sanatorium and x-ray activity on stereoscopic films also taken during the first week:

When the disease was "clinically inactive," 37 per cent showed no change, 17 per cent showed an increase.

When the disease by x-ray examination was inactive, 48 per cent showed no change and 6 per cent showed an increase.

When the disease was "clinically active" 15 per cent showed no change and 53 per cent grew worse.

When the disease by x-ray examination was active, 3 per cent showed no change and 62 per cent grew worse.

These differences are strikingly in favor of x-ray interpretation of activity; and the better the films and the more perfect the stereoscopic effect, the easier it is to pick out such changes. Low grade films or ones of an indifferent character with any blur are of little value for comparison, and it is difficult to arrest motion on films exposed more than from one fifteenth to one twentieth of a second.

The "end result shadows" are as a rule due to the organization of the foci. With serial x-ray films taken over a considerable period of time a great deal of information is obtained with regard to the evolution of these shadows, and different groups can be interpreted as older or more recent than others. The final decision, however, as to progression or retrogression or to activity or inactivity of a focus should not be drawn only from the x-ray films, although it is sometimes necessary to do this when films are the only means at our disposal to make this decision.

X-RAY DIAGNOSIS IN INFANTS AND CHILDREN

The systematic x-ray examination of infants and children is exceedingly important. No field of study offers more opportunity for satisfactory results than does the use of the x-ray film to detect pulmonary tuberculosis in the infant and child. By the film alone a diagnosis is often possible, when otherwise complete ignorance of disease would exist. The x-ray film is the most essential factor in the examination of the child's chest, and without it pulmonary disease, particularly pulmonary tuberculosis, would remain for a long time not recognized. Most pediatricians base the diagnosis of pulmonary tuberculosis almost entirely on the evidence of the film and the result of the tuberculin skin test.

Large numbers of children have been roentgenographed. Such studies have developed along different lines. Some roentgenograph only children who give a positive tuberculin test. Others roentgenograph only those who are more than 10 per cent under weight. Still others include those who are known to have been exposed to the disease and who would probably have an infection. In my opinion not only these three groups but all children should have an x-ray examination at least once a year. This last plan has been successfully carried out in Saranac Lake. As the result of the efforts of the late Dr. Lawrason Brown, all the school children in Saranac Lake have an x-ray film taken at least once a year. No discrimination is made, and all children are examined by x-rays because early in his work Lawrason Brown found that certain children, apparently above suspicion, proved to have a pulmonary disease. In connection with this x-ray examination note is made of the past and present symptoms the child may have had, family exposure, or any other points that might have a bearing on the diagnosis of a pulmonary disease. A physical examination of the lungs is made when there are any suspicious shadows on the film.

A result of this systematic examination was the finding of abnormal lung shadows in apparently normal children. On subsequent examination, some of the films showed complete clearing of these abnormalities. It would have been a mistake to say that these shadows indicated pulmonary tuberculosis. In a few instances, however, intrapulmonary nodules developed in these areas and these strongly suggested a tuberculous focus.

A few cases of clinical tuberculosis were revealed, and these few cases justified the method. The finding

of the aforementioned suspicious shadows most certainly protected these children from stresses that might have had serious results. There are instances recorded in which children who had abnormal shadows disobeyed instructions, and at a later date advanced tuberculosis was found.

X-RAY DIFFERENTIAL DIAGNOSIS IN PULMONARY TUBERCULOSIS

An analysis of x-ray films lies in one's ability to understand the reasons for normal or abnormal shadows seen in the film or plate. One should therefore become acquainted with films of the theoretically normal parts. In the lungs these theoretically normal parts may vary within wide limits.

When one roentgenographs the inflated lungs of a guinea pig or a rabbit after removal from the chest, and if the vascular system retains its blood, one obtains a film of a pair of lungs not unlike that of the human lung, i. e. two fields traversed by many linear markings radiating from two central points. This arborization is the result of shadows cast by the pulmonary system; viz., vascular, bronchial and lymph. The vascular system makes up most of these shadows. The bronchial "tree" is also important but as a rule is difficult to identify. The lymph channels go unrecognized as such.

These "trees" or linear markings start from a root and proceed toward the periphery of the lung in a more or less uninterrupted manner until the periphery is almost reached. They become more delicate as a result of their diminishing size and resemble the silhouette of a young leafless sapling. Any gross interference with this linear appearance would suggest anatomic abnormality or a pathologic change in the lung.

In the theoretically normal lung one sees a few densities at the root, possibly in the lung field; also a few shadows of a similar character, only usually smaller, or a localized increase in some of the linear markings. The question then arises How numerous can these densities or the stage of exaggeration of the linear markings become before one can regard them as evidence of past or present lung disease? No definite line can be drawn. Sampson,[6] however, presents some ideas for consideration. He divides roentgenograms into the following groups: first the theoretically normal, second the doubtful and third the positive.

He mentions the positive group reservedly, since diagnosis does not begin and end with the x-ray film but should be made on all clinical evidence even though the film may be the deciding factor.

Normal Lung.—Here one would expect to find an x-ray film free of any abnormal densities. This rarely exists, yet one may call this "normal" when having one or a few abnormal densities at the root with possibly an occasional density in the parenchymal field.

Doubtful Group.—This group embraces films in which one sees one or more of the following: more numerous densities, the shadows at the root more pronounced, a general haze in a portion of the lung field, tenting or peaking of the diaphragm, a secondary shadow in the extreme apex of the lung immediately under the second rib posteriorly, spoken of as a pleural cap, and also a slight localized or general accentuation of the lung markings.

Positive Group.—This includes anything in excess of the two preceding groups, namely coalescing of the isolated densities, blotchy shadows, fans, mottling, speckling, gross exaggeration of the linear markings and heavy homogeneous densities. Several other descriptive terms are also used and have the same meaning. Sampson offers the following terms of standardization: (1) exaggeration of lung markings, doubtful or definite; (2) stringlike shadows; (3) mottling, fine or coarse; (4) areas of rarefaction and annular shadows; (5) homogeneous densities, localized or general, light marked.

In this positive group it is more a matter of the nature of the pathologic change than the presence of a pathologic condition.

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6. Sampson, Homer L.: X-Ray Differential Diagnosis in Pulmonary Tuberculosis, Bull. New York Tuberc. **4**: 1 and 8, 1923.

THE TREATMENT OF PULMONARY TUBERCULOSIS

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No specific drug, vaccine or serum has been found as a positive cure for pulmonary tuberculosis. Favorable results have been reported following the use of gold sodium thiosulfate. We ourselves confirmed the results of Henrichsen and Sweany[1] that approximately 50 per cent of cases of advanced tuberculosis with a stationary or progressive trend are favorably influenced. The discussions at the International Conference in The Hague in 1932 were highly favorable. However, one must admit that the only real noteworthy advance that has been made in the treatment of this disease is the utilization of collapse therapy, which has furnished abundant convincing evidence of its value in the pathologic lesions of pulmonary tuberculosis.

EXPECTANT TREATMENT

To the time-honored triad of general rest, fresh air and wholesome food, modern treatment has added collapse therapy to secure local rest to the diseased lung. The therapeutic result will be in proportion to the degree, duration and timeliness of general plus local rest; the sooner the treatment is instituted the more rapid and certain will be the resolution. This is true not only in the early but also in the advanced cases and in cases in which the disease is resistant and demands some form of surgical aid.

COLLAPSE THERAPY

The therapeutic importance of collapse and compression of the tuberculous lung through operative procedures is fully recognized and remains the most significant advancement toward the healing of this disease. Cavity closure by induced collapse or compression should be instituted earlier than it often is. The time allotted to a hopeful but futile course of sanatorium routine too frequently results in extension of disease to the opposite lung, larynx or elsewhere in the body and may render the patient incurable or at least unsuitable for collapse therapy.

The various operative procedures for controlling the different stages of pulmonary tuberculosis all have definite indications and limitations, and there is no procedure yet devised which is universally applicable

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1. Henrichsen, K. J., and Sweany, H. C.: Sanocrysin Treatment in Tuberculosis, Am. Rev. Tuberc. (supp.) **28**: 1-45 (Oct.) 1933.

to all the changing phases of the disease. Every procedure must be graded to control the local lesion and utilized as necessary to avert the need of more extensive surgery. To realize the ultimate benefits of pulmonary collapse it must be combined with proper medical management rather than considered sufficient in itself, since collapse of the lung merely creates conditions that are favorable to healing. No attempt will be made to discuss fully the many procedures of this form of therapy, space being inadequate, but I will summarize those having gained acceptance and known to be of established value.

ARTIFICIAL PNEUMOTHORAX

The first and simplest procedure to be considered in a collapse therapy program is artificial pneumothorax. Induced pneumothorax is the nucleus of surgical methods to secure added rest to the diseased area of the lung. Other procedures follow successively as required, replacing early relaxation and temporary collapse by a firm, irrevocable compression. Its value is restricted to about 40 per cent of cases because adhesions either prevent any introduction of gas or allow insufficient amounts to produce a satisfactory collapse of the lung. Pneumothorax therapy should be instituted in cases of pulmonary tuberculosis with beginning infiltration as well as in moderately advanced cases if, after from one to three months' trial of sanatorium treatment, there is no improvement in the patient's condition. About 50 per cent of patients can be rehabilitated by artificial pneumothorax, the remaining ones demanding more radical methods of collapse.

Common distressing practices in pneumothorax therapy are that artificial pneumothorax is not utilized early enough or that it is continued too long in many instances wherein it is obvious that adhesions are preventing adequate collapse of the lung. Another undesirable practice is that of inducing high degrees of positive pressure in order to stretch offending adhesions; advantageous as it may seem, this practice is neither wise nor safe and frequently causes complications.

Hemoptysis, whether slight or severe, is an obligatory indication to establish an artificial pneumothorax at once, provided it is possible to determine from which lung the blood is emanating. Tuberculous spontaneous pneumothorax should be converted into a controlled artificial pneumothorax. Tuberculous pleurisy with effusion should be treated by aspiration and replacement of the fluid by controlled amounts of air, and an artificial pneumothorax maintained, with regular refills, over a period of time commensurate with the indications of the underlying disease.

Chronic fibrocaseous types of tuberculosis, without demonstrable cavity formation and with essential freedom from disease in the contralateral lung, yield the best results. In progressive fibrocaseous cavernous types with lesions more destructive in character, the end results are not so favorable. In active, advancing caseous pneumonic and caseous bronchopneumonic types of tuberculosis, regardless of incompatible opinions, excellent results are seen if a satisfactory collapse of the lung can be established.

In unilateral cavity cases a pneumothorax should be established immediately. In this way there is less danger of extension to the gastrointestinal tract, to the larynx and to the same and opposite lung. In bilateral lesions of a similar type it may be induced on the two sides, preferably alternately rather than simultaneously.

Renal and cardiac failure, or extensive emphysema, are absolute contraindications. Tuberculosis of the larynx and intestine is a contraindication if far advanced and interfering with the patient's nutrition, since all forms of treatment are unavailing in these cases. Controlled diabetes is no contraindication, nor is active disease of the opposite lung unless it is extensive or rapidly advancing.

Contralateral lung lesions are of much less importance than the type of disease on the side to be collapsed, and the adequacy of the pneumothorax. Less than 2 per cent of our patients died of complications directly or indirectly related to the artificial pneumothorax, such as gas embolism (two cases), empyema or spontaneous pneumothorax.

The length of time that a pneumothorax should be maintained is largely determined by the underlying pathologic condition. In early cases without demonstrable cavity formation, from two to three years is probably the optimal period; in those with small or medium sized cavities, from three to five years, and in cases in which there are large cavities the collapse should be maintained for at least five years. In the latter cases one frequently feels that the only safe course is to maintain the pneumothorax for an indefinite period, possibly for life.

OLEOTHORAX

Oleothorax [2] finds practical application in the treatment of tuberculous pyothorax. It may also be used as a substitute for pneumothorax in cases in which, because of an obliterating pneumothorax, premature loss of collapse is threatened. For this purpose 1 per cent of a preparation of cajuput in liquid petrolatum is commonly used. Because the oil is absorbed less rapidly than air it is usually possible to prevent additional reexpansion and avoid air refills by its use.

INTRAPLEURAL PNEUMONOLYSIS

Pleuritic adhesions which prevent a satisfactory collapse of the lung are appropriate for surgical cutting in about 20 per cent of the cases in which artificial pneumothorax has been established. Under such conditions closed intrapleural pneumonolysis is the procedure of choice whenever the adhesions are of an operable type; thus an inefficient pneumothorax is converted into an efficient one. Closed intrapleural pneumonolysis consists in the severance of restraining pleuritic adhesions under thoracoscopic guidance by means of the high frequency current or galvanocautery. Since I developed the electrosurgical method, in contradistinction to the galvanocautery method of Jacobaeus [3] we have found it possible to effect closure of cavities in approximately 70 per cent of more than 450 cases in which operation was performed. The defects of the galvanocautery are wholly lacking in the high frequency method, as unbelievably large adhesions can be severed in this manner with little discomfort to the patient and only slight subsequent reaction.

The radiographic appearance of adhesions is very unreliable—only by thoracoscopic examination can one determine their character, number and extent. These factors, plus their relationship to the lung, pericardium, nerve trunks and large blood vessels, will determine their operability.

2. Matson, Ray W.: Oleothorax, in Goldberg, Benjamin: Clinical Tuberculosis, Philadelphia, F. A. Davis Company, 1939.
3. Jacobaeus, H. C.: The Cauterization of Adhesions in Artificial Pneumothorax Treatment of Pulmonary Tuberculosis, Am. Rev. Tuberc. 6: 871-897 (Dec.) 1922.

Large adhesions extending to the lateral aspects of the chest wall, and also apical ones, as well as those extending to the diaphragm, are readily accessible electrosurgically. There is no difficulty in cutting adversely situated band adhesions—even very short ones located in the dome of the pneumothorax cavity. Broad based chest wall attachments (spindle and cone adhesions) no longer are unapproachable as formerly, when about 50 per cent were inoperable because of the presence of lung tissue and prolongations of cavities close to the chest wall. Except when cutting takes place near the intercostal nerves or brachial plexus, severing adhesions is painless and shockless. Should pain occur, local infiltration anesthesia of the involved intercostal spaces is quite easily carried out with special needles intrathoracically, according to the technic which I have described.[4]

Successful severance of adhesions by the closed method requires more skill and experience than the performance of artificial pneumothorax. The operation calls for an exacting surgical technic and a thorough knowledge of the anatomy of pleural adhesions. The operator must be quite familiar with the thoracoscopic appearance of all the intrathoracic structures. Often the surgeon undertakes this operation reluctantly because he lacks experience with pneumothorax and frequently has no knowledge of thoracoscopy. Unaccustomed to operating under the guidance of the thoracoscope, and believing that he can more accurately visualize the operative field directly, he sometimes prefers the open method of severing adhesions. But, paradoxical as it may seem, the open operation does not permit the scrupulous observation which is possible with the thoracoscope. Experience enables one to recognize the structure of tissues much better with the thoracoscope and sever large adhesions which could not be severed safely by the open method.[5] Open intrapleural pneumonolysis does not require training to acquire proficiency in an interpretation of adhesions and dexterity in the use of specialized instruments, yet it is a major procedure.

Technically, as far as the patient is concerned, the closed operation is a very minor one, scarcely more objectionable than a pneumothorax refill or diagnostic puncture. Although adhesions will be present in almost half the cases selected for pneumothorax treatment, they will not necessarily prevent a satisfactory collapse or compression of the lung. The mere presence of adhesions is no indication for operation; however, if adhesions are preventing a satisfactory pneumothorax, the operation is indicated.

We have never experienced a death directly due to the operation. Three instances of profuse hemorrhage occurred early in our work, while we were utilizing the galvanocautery and the first type of high frequency unit placed on the market. Since utilizing the Bovie unit and my own instruments, which have been used in the last 279 cases of our series, there has been no instance of hemorrhage and less than 2 per cent of hemorrhagic exudate. The source of bleeding in the latter was from the primary chest wall puncture for introducing the thoracoscope. Bleeding should never occur at the site of the second puncture for introducing the operating electrode, as this is done under thoracoscopic guidance. My present technic has greatly decreased serous (less than 1 per cent) and purulent exudate (less than 3 per cent) formation, which occurred much too often with the galvanocautery; namely, serous exudate in over 20 per cent of the cases and purulent exudate in over 26 per cent. Severe febrile reaction is no longer encountered in our series.

4. Matson, R. C.: Intrapleural Pneumonolysis by Closed Method, Am. Rev. Tuberc. **39**: 162-168 (Feb.) 1939.

5. Matson, R. C.: Cauterization of Adhesions in Artificial Pneumothorax by Jacobaeus-Unverricht Method of Closed Pneumolysis: Observations on One Hundred Cases, Am. Rev. Tuberc. **19**: 233-305 (March) 1929; Electrosurgical Method of Closed Intrapleural Pneumolysis in Artificial Pneumothorax, Arch. Surg. **19**: 1175-1192 (Dec., pt. 2) 1929; Operative Collapse Therapy in Treatment of Pulmonary Tuberculosis, West. J. Surg. **38**: 662-679 and 743-754, 1930; **39**: 13-24, 1931; Severing Adhesions in Artificial Pneumothorax by Electrosurgical Method, Surg., Gynec. & Obst. **59**: 619-629 (March) 1934; footnote 4.

INTERRUPTION OF THE PHRENIC NERVE

Interruption of the phrenic nerve is not nearly so widely used as formerly, and we have abandoned performing a radical phrenic neurectomy on the left side because of the danger of troublesome gastric dilatation. As a matter of fact we are resorting more and more to temporary phrenic surgery, with hemidiaphragmatic paralysis obtained by crushing the phrenic nerve. This can be repeated, if desired, and Alexander[6] has shown that it is preferable to the permanent procedure of exeresis. Paralysis of the hemidiaphragm, even if there is no appreciable elevation, provides a continuous uniform relaxation of the lung.

Those attempting phrenic nerve surgery should be well versed in the topographic anatomy of the neck, as well as the anatomy of the nerve and its more than twenty abnormal types[7] (anomalies are found to exist in 25 per cent of cases). Damage has occurred to the subclavian vessels, internal jugular, sympathetic trunk and vagus nerve; also instances have been cited in which no phrenic nerve was found, but these were instances, no doubt, of abnormal types. I know of no authenticated absence of a phrenic nerve.

This operation may be considered when a successful pneumothorax cannot be induced, controlled or continued, when an intrapleural pneumonolysis is impossible or inadequate, and before other more radical measures are contemplated. However, the operation is not required in combination with every pneumothorax, whether the collapse is satisfactory or not, as many workers advise.

Earlier in my practice phrenic neurectomy preceded thoracoplastic procedures, especially in the fibrocaseous cavernous group of cases, but I now do this operation only in exceptional cases prior to a thoracoplasty. In this special group the results are often so gratifying that major surgery is unnecessary, but in most cases the operation has not resulted in any noticeable improvement in the condition.

In caseous pneumonic types of tuberculosis the results have not been satisfactory.

In cases in which disease is confined to the lower lung or perihilar region, one hesitates to do a many stage thoracoplasty both because of the magnitude of the procedure and because of the sacrifice of lung tissue. A satisfactory rise in the diaphragm provides adequate, selective collapse, and in this type of case one gets the most gratifying results from phrenic interruption. The collapse can be greatly enhanced by the combination of pneumoperitoneum with the phrenic paralysis. It is usually possible, by these combined procedures, to maintain the diaphragm at the level of the second or third rib anteriorly.

6. Alexader, John: Temporary Phrenic Nerve Paralysis: Its Advantages Over Permanent Paralysis in the Treatment of Phthisis, J. A. M. A. **102**: 1552-1553 (May 12) 1934.

7. Matson, Ray W.: Exairesis of the Phrenic Nerve in the Treatment of Pulmonary Tuberculosis, Am. Rev. Tuberc. **22**: 1-34 (July) 1930.

In our series of more than 500 cases of phrenic neurectomy, 15 per cent—including patients with cavernous tuberculosis who were candidates for major surgery—recovered as a result of the phrenic operation.

EXTRAPLEURAL THORACOPLASTY

Present day technic makes extrapleural thoracoplasty a truly selective and lung conserving measure and also permits its use in combination with other collapse procedures on the opposite side. Thoracoplasty should always be considered when other collapse procedures have failed to control the disease or close cavities. The determination to resort to this type of surgery should not be postponed until the patient is too poor a surgical risk to warrant its trial. A much more comprehensive preoperative study is required of cases selected for thoracoplasty than for artificial pneumothorax. Thoracoplasty is indicated when the disease is predominantly unilateral and of a productive or fibroid type, with or without cavity formation. The patient should be preferably under 50 years of age and his general condition should be fairly good.

The contraindications to thoracoplasty, in addition to those which obtain for pneumothorax, include poor surgical risks, extensive bilateral involvement and coexistent incurable organic disease.

In this operation the number and lengths of ribs to be resected depend on the type of disease and the patient's general condition. I always prefer to do the posterior operation in at least two stages, beginning with resection of portions of the upper five ribs first or complete resection of the upper three ribs and part of the fourth rib. Resection of portions of the lower ribs then follows within the course of the next week or ten days. In cases of large upper lobe cavities, an upper posterior phase operation, with resection of the upper five ribs, is carried out—followed within the course of a week by resection of the remaining portions of the upper three or four ribs close to the sternum. If it is necessary, the posterior lower phase operation is carried out as soon as possible.

In lower lobe tuberculosis the lower phase operation is carried out first. In poor surgical risk cases, in which only a graded thoracoplasty is permissible, sections of two or three ribs are removed at a time; other operations follow within the course of a week or ten days. A partial thoracoplasty, whether unilateral or bilateral, may be considered in certain carefully selected cases, when the lesion is apical or subapical, with essential freedom from disease below the third or fourth rib posteriorly. Patients presenting large cavities and who have a pneumothorax offer many difficulties of closure. In most instances it is much better to abandon the pneumothorax and carry out the thoracoplasty after the lung has reexpanded. In bilateral apical involvement a bilateral partial thoracoplasty or other combination of procedures may be considered.

Results—The greatly improved and well group, in a series of over 400 cases, comprises approximately 60 per cent of the series. The direct operative mortality has been less than 2 per cent. I attribute a large proportion of the uncomplicated results to careful selection of cases and their preoperative and postoperative care, and especially to persistence in placing the patient in an oxygen tent for hyperventilation (one half out of every three hours during the twenty-four hours preceding and for forty-eight hours following operation).

EXTRAFASCIAL APICOLYSIS

Extrafascial apicolysis is indicated in the case of apical and subapical cavities with dense fibrotic pericavity zones without exudative foci. For closure of primary or resistant apical cavities Semb[8] proposes extrafascial apicolysis combined with an upper phase thoracoplasty. The technic consists of resection of the entire first, second, third and part of the fourth ribs, including portions of the transverse process, with or without exarticulation of the ribs posteriorly, and resection anteriorly close to the sternum. The lung is then freed over the diseased area by careful blunt dissection in the endothoracic fascia, which includes severance of the connective tissue bundles overlying the apex of the lung. A portion of lung containing the cavity is detached in this way to allow contraction from the periphery toward the hilus, simulating that obtained by artificial pneumothorax. Complete collapse of cavities is claimed by Semb in 90 per cent of his cases. Eighty per cent were rendered sputum free, and his mortality was less than 5 per cent if the resection did not exceed six ribs at one stage. Gale and Midelfart[9] have improved this procedure with laudable changes. They report sixty-five cases with five deaths (6.6 per cent) and forty-eight cases (73.5 per cent) with perfect cavity closure.

I myself feel that the popularity of this operation is diminishing, as it requires considerably more time technically than other surgical collapse procedures, and only good risk cases should be subjected to it. As for results, there is a question in my mind whether they are better than in the next procedure.

EXTRAPLEURAL PNEUMOTHORAX

The outcome of extrapleural pneumothorax has been described approvingly in numerous reports. It consists in removal of a section of the third or fourth rib posteriorly, then separation of the parietal pleura from the endothoracic fascia and the establishment of an extrapleural space sufficiently large to close the cavity in the lung. The wound is closed without drainage. Air refills are carried out within the course of the next twenty-four hours, as in artificial pneumothorax, being controlled by the fluoroscope. This operation may be considered in selected cases of unilateral or bilateral upper lobe cavities, provided of course that intrapleural pneumothorax has been attempted and found impossible because of adhesions. There is rarely any shock to this operation. It can be done under local anesthesia and is applicable to patients who are poor surgical risks, who could not undergo the standard type of thoracoplasty and who by no means could withstand the radical apicolysis of Semb.

The fact that the parietal pleura can be fairly readily stripped from the endothoracic fascia has resulted in the development of a number of extrapleural procedures. Extrapleural pneumothorax is particularly valuable in apical or upper lung lesions in which a selective collapse would appear to be adequate. It has the advantages of being a one stage operation and fairly free from shock, which enables it to be used in some cases in which thoracoplasty is contraindicated on account of age or general condition. In addition, the slight scar resulting and the absence of subsequent deformity all weigh heavily in its favor. It is highly selective and con-

8. Semb, Carl: Thoracoplasty with Extrafascial Apicolysis, Acta chir. Scandinav. (supp. 37, art. 2) **76:** 1-85, 1935; Brit. M. J. **2:** 650-656 (Oct. 2) 1937.

9. Gale, J. W., and Midelfart, P. A.: Extrafascial Apicolysis, Surgery **3:** 234-259 (Feb.) 1938.

serves healthy lung tissue. The necessity of giving constant refills of air afterward and the fact that they must be given fairly often and with extreme care lest the expanding lung be injured are among the obvious drawbacks. For these reasons many of these extrapleural spaces are now being filled with oil, and these patients then have an extrapleural oleothorax.

EXTRAPLEURAL PACK

I have developed an extrapleural procedure which eliminates most of the aforenamed disadvantages. The extrapleural space is maintained by filling it with a pack fashioned of flexitissue, which, being completely inert when buried in the tissue, can be left in this space indefinitely. I now have a number of patients who have been carrying these packs for more than two years and who are working and apparently well. The pack should ordinarily be left in place for from six months to two or three years. On removal of the pack the space behaves like an abandoned pneumothorax cavity and is filled either with a serous exudate or by the expanding lung. The collapse secured by this means is constant and probably more highly selective than that obtained by any other collapse procedure. The necessity for refills is eliminated. I am now employing the procedure in preference to a limited upper phase thoracoplasty in almost all cases; it can also be used as a supplementary procedure in cases of residual cavity following thoracoplasty. The results obtained by it in more than sixty cases have been most satisfactory.

A further extension of this extrapleural stripping can also be done by the closed method under thoracoscopic vision. By this means large surface to surface adhesions, which are rendering a pneumothorax ineffectual, can be stripped from the chest wall. I have devised a cutting instrument [10] for intrapleural use by which the pleura is cut outside the line of lung attachment and then, with the flat side of the instrument, the lung is peeled off the chest wall with the two layers of pleura adherent to it. By this means a type of adhesion hitherto considered inoperable is now amenable to a closed intrapleural technic.

Numerous other operative methods of securing local rest for the diseased part of the lung have been tried from time to time. The transpleural aspiration of tuberculous cavities advocated by Monaldi (according to the report by Grass [11] at the Forlanini clinic in Rome) is now being tried in this country. It is too early to evaluate the results. Lobectomy and pneumonectomy have not as yet earned a place in the therapy of tuberculosis, although they have been successfully employed in isolated cases.

CONCLUSIONS

There is much cause for optimism regarding the treatment and curability of tuberculosis at the present time. The rapid progress which has been made in this field is due to earlier diagnosis as a result of improved and intensified methods of case finding, the universal availability of pneumothorax treatment and the increasing cooperation between phthisiotherapists and thoracic surgeons. Further refinements in technic and the standardization of collapse procedures already developed and available should continue to improve the outlook for the victims of this disease.

1004 Stevens Building.

10. The pleurotome, manufactured by the George P. Pilling & Son Company, Philadelphia.

11. Grass, Heinrich: Cure of Cavities by Suction Drainage According to Monaldi, Ztschr. f. Tuberk. **84**: 1-120 (Dec.) 1939.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. MYERS, HARRINGTON, SPRAGUE (R.N.) AND PÉREZ, DR. KINGHORN AND DR. MATSON

DR. RUTH E. BOYNTON, Minneapolis: The importance of the use of the tuberculin test in the diagnosis and epidemiology of tuberculosis has been emphasized in the papers of Dr. Myers and his associates and Dr. Kinghorn, who referred particularly to the use of the tuberculin test in students in medicine and nursing. At the University of Minnesota, all students in the schools of medicine and nursing are given tuberculin tests on entrance, and those showing no reaction to the test are retested periodically. A nonreactor who subsequently reacts to the test can mean but one thing, that during the interval the student has been exposed to a tuberculous individual. We have attempted in all such cases to trace the source of the infection. In some cases there has been a known exposure in a tuberculosis service. In others with no known exposure, careful checking has shown an unrecognized case of tuberculosis in a patient admitted to the general hospital in the surgical or medical service for some nontuberculous condition. A few years ago a student nurse who had been a nonreactor until her senior year became tuberculin positive and within a few weeks developed a pleurisy with effusion which was proved tuberculous. She had been caring for a patient on whom a diagnosis of pneumonia had been made but who later was found to have tuberculosis. To prevent the possibility of unrecognized cases of tuberculosis occurring in the University Hospital, three years ago the hospital instituted a plan to detect and pick up these cases of tuberculosis on admission. Each new admission to the hospital is now examined fluoroscopically and if the results are suggestive the patient is roentgenographed. A much more serious source of infection to students in nursing and medicine is the known tuberculous patient in a tuberculosis service. In a study reported a year ago, it was found that 22 per cent of a group of tuberculin-negative student nurses became reactors after spending six weeks in a tuberculosis service, an infection rate five times as great as that which occurred in the nurses in the general service. Such information obtained by the use of a simple procedure such as the tuberculin test gives information of the greatest value in tracing the source of infection in these students as well as pointing out the fact that these are the students who must be carefully watched for the development of signs of the disease.

DR. LOUIS HAMMAN, Baltimore: Those fortunate enough to have heard Dr. Kinghorn speak about the diagnosis of pulmonary tuberculosis fifteen or twenty years ago must have been a little surprised by his discussion this afternoon. In those earlier years he was accustomed to consider in detail the importance and relative value of all methods of examination; today, although in the introduction he stated clearly that no method of getting information should be neglected, he has given his attention almost exclusively to the roentgen ray. This change of emphasis is shared by most authorities in this field. I do not criticize the attitude. I agree with everything that Dr. Kinghorn has said about the value of roentgenograms in this field and yet I fear that too exclusive an emphasis on the roentgen ray may lead some to abandon or neglect the old methods of examination, which I believe still to be useful, and may leave the impression that the roentgen ray has become so precise that all difficulty has vanished from this field of diagnosis. Most seasoned practitioners will agree that percussion and auscultation are not now practiced as assiduously as they were in former years. Indeed, in some quarters there is a tendency hurriedly to leave the examining stool and the bedside to spend most of the time before the viewing box. It is pertinent to point out that the material Dr. Kinghorn has worked with is different from the material seen daily by physicians practicing in large general hospitals. Dr. Kinghorn sees mostly cases in which the question of diagnosis is whether the patient has pulmonary tuberculosis or has not, and patients under treatment in whom the diagnosis has been established. In the large general hospital physicians encounter patients with more acute or unusual forms of pulmonary tuberculosis under circumstances when tuberculosis must be distinguished from all other forms of pulmonary disease. In this field of differential diagnosis the roentgen ray is indispensable but it is far from infallible. The diagnosis depends on a careful consideration of all the clinical evidence and if we rely

exclusively or even preponderantly on the roentgenogram many errors will be made.

DR. ALEXIUS M. FORSTER, Colorado Springs, Colo.: Dr. Matson mentions the triad of rest, fresh air and good food, and in his practice they still play a vital part. However, he stresses the remarkable advance of surgery in the treatment of pulmonary tuberculosis. I believe that any doctor treating tuberculosis today who fails to offer his patient, at the proper time or in their proper order, one or several of the surgical measures recommended by Dr. Matson is recreant in the performance of his duty. However, time is an important element in the treatment of tuberculosis and undue haste can do the patient as much harm as delay. There are so many new measures and improvements in technic that it takes wide experience to fit to the patient, at the proper time and in the proper order, each of the many measures which help in giving localized rest to diseased areas. Dr. Matson did not have the time to mention some of the minor but still helpful ones, such as postural rest, shot bars and some of the mechanical braces. Time also teaches us to avoid some of the bad after-effects of mechanical interference with the operation of the respiratory apparatus. There are many measures which, like pneumothorax, offer localized rest to the diseased area. Bronchoscopy has made a place for itself in the treatment of tuberculosis but, like other measures, must be used with gentleness and judgment. Anesthesia, with the use of oxygen and other methods of preparation and aftercare, does much to make for success or failure. We welcome the detailed interest of the general practitioner and surgeon in this spectacular advance, but we wish to impress on them the woful lack of interest shown by the profession as a whole in the apparently prosaic measures needed by every doctor if we are to find the cases promptly for the adequate application of treatment. Doctors are sadly remiss in leaving too much to public health agencies and lay groups the whole problem of case finding.

BENIGN GYNECOLOGIC HEMORRHAGES

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Uterine bleeding other than the normal physiologic loss of blood during menstruation is probably one of the most frequent conditions that the general practitioner, as well as the gynecologist, has to contend with, and a correct diagnosis as to whether it is of benign or malignant origin may be of vital importance.

The causes of benign hemorrhage may be classified as follows:

1. Functional hemorrhages as a result of endocrine dysfunction and imbalance occurring at puberty, during the childbearing period and at the menopause when there is no demonstrable lesion.
2. Hemorrhages associated with neoplastic diseases including cervical and corporeal polyps, myomas, adenomyosis and ovarian tumors.
3. Hemorrhages associated with inflammatory disease, as salpingitis, oophoritis and tuberculosis.
4. Bleeding from retained gestational products after abortion or full term delivery, and tubal pregnancy.
5. Intra-abdominal hemorrhage as a result of ectopic pregnancy, endometriosis and ruptured ovarian cysts and myomas.
6. Uterine bleeding from miscellaneous causes, such as cervicitis with erosion, subinvolution, hemophilia, hypertension and postoperative hemorrhage.

FREQUENCY AND ETIOLOGY

In the past ten years the gynecologic discharges at the Woman's Hospital, New York, numbered 19,603. Severe hemorrhage as a predominant symptom occurred in 371 cases, or nearly 2 per cent. It was present in 254 tubal pregnancies, as a complication in four cases of carcinoma of the fundus and in fifty-three cases of carcinoma of the cervix. Secondary hemorrhage as a postoperative complication occurred in twenty-six cases of amputation of the cervix, in twenty-three cases of cauterization or conization of the cervix, in one case of plastic operation on the pelvic floor and in eight cases of plastic operation on the vaginal walls. There were two cases of hemorrhage in which the cause was undetermined.

Weintraub of Brooklyn in a recent report found the frequency of uterine hemorrhage among 4,421 patients admitted for gynecologic conditions other than pregnancy to be 738, or 16.6 per cent. The commonest single cause was fibromyomas, 46 per cent. Endometrial hyperplasia occurred in 23.7 per cent of the cases, usually associated with follicular cysts of the ovary. In 9.2 per cent it was due to fibrosis uteri, in 6.6 per cent to cervical or fundal polyps and in 3.7 per cent to malignant growths.

Floyd Keene of Philadelphia studied 782 cases of postmenopausal bleeding and found that 60 per cent were due to malignant tumors; 78.4 per cent were associated with some form of neoplastic disease of the cervix, fundus or adnexa, and 75.4 per cent of these were malignant. In over half the entire series bleeding was of cervical origin, and 56 per cent of these lesions were malignant; 40 per cent were fundal in origin, of which 61.5 per cent were malignant. In thirty-eight cases no organic lesion could be found.

Howard Taylor Jr. of New York, in a study of 406 cases of postmenopausal bleeding, and TeLinde of Johns Hopkins University, in 349 cases, found approximate percentages.

Postmenopausal bleeding, especially after a year, therefore, is always important, as with a normal cervix it is of malignant origin in two thirds of the cases.

FUNCTIONAL HEMORRHAGE

Uterine hemorrhage may be regarded as functional only when no general or local lesion can be found, the bleeding symptoms in all cases being similar. Functional bleeding may occur during adolescence or the reproductive period, at the menopause and later. The accepted theory is that it is due to an upset in the ovarian rhythm. There is an excess of estrogen from persisting ovarian follicles and a deficiency of progesterone, the inhibiting hormone of the corpus luteum. This results in an excessive growth of the endometrium and the absence or defect of a premenstrual phase, so that it disintegrates into abnormal, prolonged and excessive bleeding.

The function of the ovaries is governed and activated by the anterior pituitary through the follicle stimulating and luteinizing factors; therefore any failure or deficiency of the function of the anterior pituitary will result in ovarian dysfunction. The abnormal bleeding associated with adolescence will frequently be corrected naturally.

As the cyclic phase of the endometrium reflects the ovarian activity, a biopsy of the endometrium is essential as an index of the ovarian function in all cases of functional bleeding, and the most commonly observed change is hyperplasia, frequently of the polypoid or Swiss cheese type.

The thyroid is an important factor in adolescence; hyperthyroidism or hypothyroidism may be a factor in irregular bleeding, and the basal metabolic rate should

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be ascertained and the appropriate therapy employed. Progesterone to stimulate luteinization may correct the irregularity, or the anterior pituitary-like luteinizing principle, such as chorionic gonadotropin, may be successful, as the common defect in all functional bleeding is the absence of the corpus luteum, the formation of which is caused by progesterone.

Fatal functional bleeding has occurred in adolescence. Hamblen of Duke University has reported a case in a 15 year old patient with atrophic endometrium, the severe ovarian failure being probably due to the low level of estrogen.

Injections of moccasin snake venom have been employed with success in seventeen of twenty cases of functional bleeding by Goldberger of New York. He states that it is of no value with fibroids.

In adolescence, when the blood loss is a serious menace and endocrine therapy has failed, repeated curettage should be tried, and as a last resort small intrauterine doses of radium may be employed, with from 200 to 300 milligram hours as the maximum, which may be repeated if necessary. The danger of sterilization from larger doses is definite.

As functional uterine bleeding may be due to excessive stimulation of the anterior pituitary, Turpault in France and Foss in England report good results from administration of testosterone propionate in attempts to control this excessive function. Béclère of Paris believes that the results with testis hormone are encouraging, but since large doses are required he cautions with regard to the unpleasant symptoms which may be produced, such as acne, hirsutism, gain in weight and voice changes.

Functional bleeding in women of the childbearing age should always have a diagnostic endometrial biopsy, and if endocrine therapy fails a curettage and intrauterine application of radium of from 300 to 400 milligram hours is indicated. We have found that 600 milligram hours is within the danger zone of sterilization.

Norris and Behney of Philadelphia, in 1,437 cases of benign hemorrhage, found that in 750 cases it was functional and in 687 due to myomas. Using intrauterine radium therapy they had satisfactory results in 83 per cent, relapses developed ten years or more afterward in 3 per cent, and carcinoma developed after irradiation in 1.09 per cent.

In functional bleeding at the menopause or after, the most satisfactory treatment comprises a diagnostic curettage to rule out possible malignant disease and the intrauterine application of radium. A dose of 1,800 milligram hours is an average amount to insure permanent stoppage of the bleeding. I believe that this is preferable to ovarian irradiation with x-rays. Transfusion should be used in cases with low hemoglobin. The theory that functional uterine bleeding is invariably associated with hyperplasia of the endometrium cannot be accepted. Jones of Johns Hopkins University found that in 14 per cent of eighty-three consecutive cases bleeding was associated with the secretory phase of the endometrium.

If in a case of postmenopausal bleeding with a slightly enlarged uterus and ovary the biopsy reveals hyperplasia of the endometrium, a granulosa cell tumor should be suspected.

NEOPLASTIC DISEASES

Cervical and fundal submucous polyps are prone to hemorrhage of a continuous "spotting" type, especially after coitus, douche or exercise, with menorrhagia at the period time, and usually a polypoid type of endometrial hyperplasia is present. The treatment is curettage and operation.

Cervical or fundal submucous myomas are prone to severe and dangerous bleeding, probably as a result of necrosis and ulceration. Myomas that do not invade or encroach on the endometrium are not the cause of uterine bleeding, as many suppose. There is a prevalent conception that abnormal bleeding is a specific characteristic of fibroids entirely distinct from hemorrhage from nonmyomatous uteri. As Graves of Boston has emphasized, the processes that lead to bleeding are hormonal and not dependent on the myomatous growth itself. The bleeding, then, in nonmyomatous and in myomatous uteri are identical in origin—hormonal.

There is no bleeding or change in the endometrium in fibroid conditions unless there are cystic changes and absence or defect in the corpus luteum of the ovaries, the exception to this occurring with the submucous myomas. In such cases there is an abnormal vascularity of the growth, and the area of the uterine cavity is increased. The contractions of the uterus and the corrosive action of the menstrual ferment trypsin all favor rupture of the delicate superficial vessels on the surface of the submucous growth, and necrosis or trauma causes rupture with resulting menorrhagia or metrorrhagia with clots. This is always of a venous type and may be controlled by packing.

Bleeding from a fibroid uterus after the menopause is always to be considered of importance. It may arise from a necrotic submucous growth, sarcoma or carcinoma.

Surgical therapy is indicated for bleeding myomatous uteri as a general rule. In the childbearing age myomectomy with removal of a submucous growth by vaginal hysterotomy may be possible. If the myomatous invasion of the uterine musculature is too extensive hysterectomy is indicated, with conservation of the ovaries in young women.

In the third or fourth decade irradiation is not suitable for bleeding with myomas, as a sterilizing dose is necessary to cure. An inadequate, nonsterilizing dose will give temporary relief of the bleeding, but the myomas will develop further. In the fifth decade irradiation is excellent for abnormal bleeding with associated small intramural growths. A sterilizing dose must be given so as to destroy the ovaries. In such cases radium is preferable to roentgen therapy in my hands.

Radium is of no use in the treatment of postclimacteric fibroids without bleeding. If the growths produce pressure symptoms, hysterectomy is necessary.

Adenomyosis is a non-neoplastic disease but is due to an invasion of endometrial glands into the uterine muscle tissue with resulting hypertrophy. Sampson's theory of endometriosis may account for the invasion of the musculature of gland elements. Abnormal bleeding is the most important symptom, usually with profuse menorrhagia and a symmetrically enlarged uterus without intermenstrual flow. Radiation therapy is of little benefit in this type of disease, and its failure to relieve the bleeding may be of diagnostic value. Surgical treatment is indicated.

Generally speaking, benign ovarian neoplasms are symptom free as to bleeding, and until their size is considerable or complications set in they are frequently not discovered. Cystic degeneration of the ovaries may develop prolonged menstruation or spotting as a result of the imperfect formation of the corpus luteum, especially if there is formation of a corpus luteum cyst. Simple follicular cysts frequently cause no menstrual

irregularity. Only about 12 per cent of patients with dermoids have menstrual disorders, and this is true of pseudomucinous cystadenomas also. The granulosa cell type of tumor, however, is frequently associated with bleeding.

Endometriosis is essentially a premenopausal disease, and in over 50 per cent of cases menorrhagia or metrorrhagia is present, but these cases are usually associated with uterine and ovarian pathologic change.

RETAINED PRODUCTS OF GESTATION

One of the most common causes of excessive and prolonged uterine bleeding is the retention of gestational products following labor or abortion. Consequently this should always be borne in mind if a careful history reveals any delay in a previous menstrual period. In ectopic gestation spotting or metrorrhagia is almost always associated with the other characteristic symptoms. After the death of the embryo, bleeding usually ceases.

INFECTIONS

In acute and subacute tubal and ovarian infection menorrhagia, increased frequency and occasionally metrorrhagia are symptoms, and with the associated pain they complicate the differential diagnosis from tubal pregnancy. The pelvic congestion and disturbance of the ovarian function are the cause.

Tuberculosis of the tubes, which is usually secondary to tuberculosis elsewhere, may be associated with irregular or excessive menstruation, but it is not the rule.

INTRA-ABDOMINAL HEMORRHAGE

The most common forms of intra-abdominal hemorrhage of genital origin is that which is associated with ectopic pregnancy, which may vary from slight to very extensive bleeding. In the cases with intermittent bursts of bleeding, a study of the white blood count is of diagnostic value, as shown by Farrar. With each bleeding there is a definite rise in the white count followed by a recession as the blood is absorbed. In excessive bleeding reflex shoulder pain is present, and Cullen has observed bluish discoloration of the umbilicus. Intra-abdominal hemorrhage may occur from rupture of the pedicle of a pedunculated myoma; also torsion of such a growth may cause rupture of the superficial veins, and necrosis in such a case may result in dangerous or even fatal hemorrhage.

Jones of Texas has reported three cases of massive abdominal hemorrhage from a ruptured corpus luteum cyst. These occurred on the fifth, sixteenth and twenty-first postmenstrual days.

Sackett of New York and Harris and Groper of San Francisco have reported similar instances. Hoyt and Meigs of Massachusetts and Couvert of France also report cases. Guillemin of France cites a case of a 16 year old girl, a hemophiliac, who had a severe intraperitoneal hemorrhage as the result of rupture of a graafian follicle, and who ten months later had a similar rupture on the other side. Hemorrhage from rupture of a follicle is more common than generally realized. Greenhill of Chicago has had five cases, one with a recurrence on the opposite side.

In all such cases the ovary should be conserved if possible, the cyst lining being removed and the ovary sutured. Trauma may produce rupture of ovarian cysts with resulting shock and hemorrhage.

MISCELLANEOUS CAUSES

Among the miscellaneous causes of uterine bleeding may be mentioned marked cervical erosions, which frequently give rise to spotting after coitus or douches. The same symptom may occur in senile vaginitis. Hypertension producing arteriosclerosis of the uterine vessels may be a cause of bleeding, which thus is analogous to epistaxis. Disease of the thyroid may cause irregular uterine bleeding. Constitutional diseases as an etiologic factor are rare, although typhoid, pneumonia, influenza, chronic valvular disease, diabetes, hemophilia, scurvy and syphilis may have a tendency to produce menorrhagia. The treatment of all the conditions mentioned is to remove the cause.

TRAUMA

Accidents producing injury of the external genitalia are a frequent cause of severe hemorrhage, especially if the venous plexuses in the labia are lacerated. Many cases of severe hemorrhage following defloration have been reported.

Not infrequently troublesome hemorrhage may follow a plastic operation on the cervix, vagina or perineum. This type of bleeding is prone to occur after amputation of the cervix, usually about the tenth day, and may be a serious complication. It is a secondary hemorrhage requiring suturing and frequently transfusion. Primary bleeding usually comes from an artery in the vaginal wall or pelvic floor. Severe hemorrhage has occurred after conization of the cervix with the high frequency knife.

Finally, physicians, as well as women, should be cautioned as to the danger of regarding irregular bleeding at the menopause age as normal. In every case it should be considered as possibly malignant until this is disproved.

101 East Eightieth Street.

Clinical Notes, Suggestions and New Instruments

THE DANGER OF GOLD SALT THERAPY

REPORT OF FATAL CASE

NORMAN LARUE ANDERSON, M.D.
AND
WALTER LINCOLN PALMER, M.D.
CHICAGO

During the past two decades the use of gold salts in the treatment of various diseases has become increasingly popular. In particular, the therapy of so-called chronic atrophic arthritis has resulted in an increasing number of favorable reports. In a series of 900 cases, Hartfall, Garland and Goldie [1] reported apparent cure or striking improvement in 80 per cent. Forestier [2] records good results in at least 70 per cent of his cases. In the series of Copeman and Tegner,[3] 94 per cent showed demonstrable improvement. In general it may be said that cures have been accomplished in an average of 10 per cent of foreign cases and in from 0 to 6 per cent of American cases.[4] Other diseases which are said to be benefited by gold therapy include lupus erythematosus, cutaneous tuberculids and syphilis.

There is seldom an article on the subject of gold therapy, however, which does not call specific attention both to the mild and to the severe toxic reactions which may be encountered in many cases under gold salt therapy. The literature abounds with reports of severe toxic reactions, and many deaths due directly to administration of gold salts have been recorded.

From the Department of Medicine, University of Chicago.

1. Hartfall, S. J.; Garland, H. G., and Goldie, William: Gold Treatment of Arthritis: A Review of 900 Cases, Lancet **2**: 784 (Oct. 2), 838 (Oct. 9) 1937.
2. Forestier, Jacques: Rheumatoid Arthritis and Its Treatment by Gold Salts, Lancet **2**: 646 (Sept. 22) 1934.
3. Copeman, W. S. C., and Tegner, William: A Review of Gold Therapy, Lancet **1**: 554 (March 6) 1937.
4. Gold Sodium Thiosulfate in Arthritis, Queries and Minor Notes, J. A. M. A. **114**: 2049 (May 18) 1940.

Hartfall, Garland and Goldie reported that 40 per cent of 900 patients with rheumatoid arthritis treated with gold salts showed toxic effects.

A multiplicity of reactions have been observed. Sollmann [5] draws attention to the similarity in their toxic reactions of gold salts and arsphenamine. Driver and Weller [6] have listed these reactions in perhaps the most logical and complete manner:

A. Immediate:

1. Anaphylactic: syncope, shock, nausea, vomiting, edema, hot flushes, tachycardia, perspiration.
2. Febrile, with malaise and headache.
3. Metallic taste in mouth.
4. Foreign protein reaction.

B. Delayed:

1. General: fever, headache, nausea, vomiting, malaise, albuminuria, hematuria, oliguria, anuria, stomatitis, ulcerative and hemorrhagic gingivitis, hepatitis with icterus, deafness.
2. Gastrointestinal: vomiting, diarrhea, ulcerative and hemorrhagic enteritis.
3. Dermal: itching, erythema, keratoderma, leukoplakia, lichen planus; urticarial, scarlatinal, morbilliform, papular, vesicular, bullous or hemorrhagic dermatitides.
4. Vascular: purpura, granulocytopenia, hypochromic anemia, aplastic anemia, hemoptysis, epistaxis, colitis, metrorrhagia, hematuria.

The use of gold salts may also cause other bizarre reactions not listed here.

The most extensively used salt is gold sodium thiosulfate, which is now becoming more readily available in increasing quantities and is advertised as possessing very low toxicity. This preparation contains 37.4 per cent of metallic gold. It is dissolved in distilled water and suitably buffered for intravenous use. The practice among most physicians is to give from 5 to 10 mg. doses weekly, gradually increasing to 50 mg. each week if no reactions occur. Total dosages now average around 1 Gm., but formerly much larger doses were used.

According to German and King,[7] the most important contraindications to gold therapy are pregnancy, anemia, ulcerative colitis, nephritis, diabetes, hepatic disease, certain cutaneous eruptions and congestive heart disease. Other contraindications are active tuberculosis, previous purpura and previous attacks of granulocytopenia.

In view of the apparently increasing popularity of gold salt therapy and the increasing availability of the drug, we feel that it is important to add to the long series of severe reactions and fatalities by reporting a case of fatal poisoning probably due to gold salt therapy.

REPORT OF CASE

History.—Mrs. N. M., a widow aged 47, Italian, admitted to the Albert Merritt Billings Hospital on March 7, 1940, complained of nausea, vomiting, fever, diarrhea and dry mouth of two weeks' duration. Her symptoms began with fever, followed by a series of vomiting episodes and dull pain in the lower part of the abdomen. On the second day she began to have frequent loose, watery green stools. The fever continued, the nausea and vomiting increased and on the third day after the onset she vomited everything she swallowed. The pain in the lower part of the abdomen abated somewhat after the first two days. The symptoms continued, and on the seventh day a local physician was called who made a diagnosis of enteritis of unknown origin. Sodium salicylate was prescribed, since the patient also complained of pain in the muscles of her back and legs. The illness continued with persistent nausea, vomiting and diarrhea, averaging from eight to twelve stools daily, and on the thirteenth day the physician was again called. This time he advised immediate hospitalization in order that she might be treated more adequately.

On the next day, fourteen days after the onset, the patient was admitted to the hospital. At this time it was revealed that she had received intravenous gold sodium thiosulfate the previous month because of arthritis of the right shoulder. This drug had been given by another local physician. The initial dose was 50 mg., repeated three or more times from January 29 to February 15, and on February 22 the onset of the symptoms occurred. The total dosage used in this case was 200 mg. The physician who gave this drug reported that she had shown no evidence of any toxicity until after the last injection.

Examination.—On admission the patient was well developed and moderately obese, of dark complexion and markedly dehydrated, and she complained bitterly about a dry burning sensation in her mouth. She was having frequent dark green liquid stools. The oral temperature was 97.2 F., pulse 78, respiratory rate 22 and blood pressure 130 systolic, 95 diastolic. The mucous membranes of the mouth were dry, hyperemic and slightly swollen, but no ulceration was seen. The abdomen was moderately obese, soft and slightly tympanitic, with moderate discomfort on deep pressure suprapubically, without rebound tenderness.

The hemoglobin content was 11.6 Gm. (Sahli), the red blood count numbered 4,500,000 and the white cells 14,000, with a differential count of 80 per cent segmented forms, 11 per cent lymphocytes, 8 per cent monocytes and 1 per cent eosinophils. Thirty per cent of the segmented forms were immature. Urinalysis showed a specific gravity of 1.030, no albumin, sugar or casts, a trace of acetone and occasional leukocytes in the sediment. The stools were liquid green, were foul smelling, contained some mucus and gave a one to three plus benzidine reaction. Eleven consecutive stools cultured on litmus-lactose agar, desoxycholate citrate agar and blood agar were negative for pathogens. No parasites, ova or amebas were found. Serum agglutinations for typhoid, paratyphoid A and B, Sonné and Flexner dysentery, and Brucella melitensis were negative.

The patient was given fluids immediately, both intravenously and subcutaneously. She continued to have frequent stools, seven on the first day, nine on the second, twelve on the third, nine on the fourth and one on the fifth and sixth days. On the second day her temperature rose to 101.4 F. and the pulse rate to 138. She continued to complain of a sore and dry mouth, although she did not now appear to be dehydrated. In spite of continued supportive measures she appeared to be getting sicker. On the third day she started menstruating.

On the sixth day after admission the patient ceased having stools; her urine continued to be clear except for a trace of sugar. Blood chemistry reports at this time showed a nonprotein nitrogen of 58 mg. per hundred cubic centimeters, fasting sugar 178 mg., serum chlorides 101 millimols per liter, serum p_H 7.32, carbon dioxide content 13.7 millimols per liter and a negative van den Bergh reaction and icteric index. On the next day the fasting sugar was again 178 mg., serum p_H 7.35 and carbon dioxide content 18.9 millimols per liter. Both fasting blood sugars were taken at least ten hours after parenteral fluids had been given.

The daily leukocyte count was always between 14,000 and 18,000. The parenteral fluid intake on the fourth day was 5,700 cc. and on the fifth day 7,100 cc. Also on the sixth day the patient became dyspneic and very nauseated. Terminal paralytic ileus developed, and 1,200 cc. of dark nonfecal liquid was removed by duodenal drainage. The rectal temperature rose to 103 F. and the pulse rate was 160. On the seventh day she became delirious and died quietly.

Autopsy.—An autopsy was performed two hours after death.

Gross Appearance: The small intestine was markedly distended without obstruction or evidence of peritonitis. The duodenum and jejunum appeared normal, although the mucosa of the jejunum was moderately edematous. The entire mucosa of the ileum was pale and smooth, covered in places with a yellowish green exudate. In other places ulcers 1 by 3 mm. extended into the submucosa. In the colon were large areas in which the mucosa was hemorrhagic and finely granular. The mesenteric lymph nodes were small and pale. The gastric mucosa, especially in the cardia, was covered with petechial hemorrhages. The liver weighed 2,000 Gm. and was quite friable, and the cut surfaces bulged markedly. The spleen weighed 180 Gm., its tissue being soft and nonresistant. Each kidney weighed 180 Gm.; aside from marked cloudy swelling they appeared normal. The lumbar and costal bone marrow was bright red.

Microscopic Appearance: The esophagus showed slight erosion of the mucosa. The gastric mucosa showed atrophic gas-

5. Sollmann, Torald: A Manual of Pharmacology, ed. 5, Philadelphia, W. B. Saunders Company, 1936, p. 1009.
6. Driver, J. R., and Weller, J. N.: Untoward Results from the Use of Gold Compounds: Report of a Fatal Case, Arch. Dermat. & Syph. **23**: 87 (Jan.) 1931.
7. German, J. D., and King, R. L.: The Use of Gold Salts in Arthritis, Clin. Virginia Mason Hosp. **19**: 1 (March) 1940.

tritis with many superimposed acute petechial hemorrhages. There was marked duodenitis with sloughing of much of the glandular epithelium. Remnants of atrophic glands were scattered between others which were large and hyperplastic. There was massive infiltration of the villi and submucosa with plasma cells, macrophages, lymphocytes and a few eosinophils. The jejunum showed more marked sloughing of the epithelium and inflammatory changes. The submucosa and muscularis of the jejunum were edematous. The entire glandular epithelium of the ileum was missing. The remaining eroded mucosa was edematous and filled with polymorphonuclear leukocytes, plasma cells, lymphocytes and some eosinophils. There was a thick fibrinopurulent membrane adherent to the surface in some areas. In a few regions small areas of ulceration extended through the muscularis mucosae. In the colon the surface epithelium had sloughed and the glands were scattered far apart and shallow. Many were cystic and filled with exudate; others were hyperplastic. There was the same intense cellular reaction interstitially as in the small bowel, with the added feature of many macrophages filled with brown pigment.

The epithelium of many of the convoluted tubules of the kidneys was swollen and vacuolated, and a few of the nuclei were absent. The lumens of some convoluted tubules were dilated, containing much protein precipitate and a few homogeneous casts. In some of the collecting tubules the epithelial cells were atrophic, eosinophilic and occasionally without nuclei. Fat stains showed slight focal fatty degeneration in the collecting tubules. The microscopic picture was perhaps compatible with a mild healing nephrosis.

Gold Content of Tissues on Chemical Analysis

Tissue	Weight of Tissue	Gold, Gm.	Gold Concentration, Mg./100 Gm. of Tissue
Analyzed fresh: kidney	96	0.0024	2.5
Analyzed after fixation with Kaiserling I and washed in water:			
Kidney	45	0.0009	2.0
Ileum	180	0.0002	0.1
Jejunum	60	0.0001	0.2
Colon	120	0.0002	0.2
Fat from colon	355	None	0
Spleen	94	0.0032	3.4
Lung	205	0.0002	0.1
Liver	100	0.0006	0.6

Tests for other metals (lead, mercury, arsenic) gave negative results.

There was moderate fatty infiltration of the liver. The remaining liver cells were swollen, and many contained giant or multiple nuclei.

In the spleen there was hyperplasia of the red pulp and focal areas of fibrin and hemorrhage in the malpighian bodies.

The lungs showed acute bronchitis with early bronchopneumonia. The abdominal lymph nodes were hyperplastic but not suppurative. Normal conditions were present in the myocardium, pancreas, adrenals, thyroid, breasts, ovaries, uterus, vagina and lumbar marrow.

Bacteriologic cultures taken at autopsy from the ileum and colon yielded negative results for pathogenic organisms, and culture from the heart's blood yielded no growth. Histochemical tests failed to show definite evidence of gold in the tissues. The anatomic diagnosis was (1) atypical, massive, subacute and focally ulcerative ileitis, (2) atypical subacute colitis, proctitis, jejunitis and duodenitis, (3) atrophic gastritis, (4) possibly mild healing nephrosis, (5) moderate fatty infiltration of the liver, (6) hyperplasia of the red pulp of the spleen and (7) acute bronchitis and early bronchopneumonia.

Specimens of the kidney, liver, spleen and gastrointestinal tract were submitted to the Cook County coroner's toxicologist;[8] the gold content found in the analysis is given in the accompanying table.

COMMENT

From the history, clinical course, autopsy, chemical analyses and an extensive review of the available literature on gold poisoning, it seems to us quite probable that this patient died as a direct result of profound toxic reactions resulting from gold salt therapy.

Experimentally produced reactions in animals have yielded characteristic results similar to those found in human beings. Brown, Saleeby and Schamberg[9] administered large amounts of gold salt to rabbits. They demonstrated that the kidneys showed swollen glomerular tufts, convoluted tubules and congested blood vessels. In the liver there was also congestion of capillaries, necrosis of parenchymal cells around the central veins and slight fatty changes and granulation in peripheral cells. The spleen showed enormous amounts of erythrocytes and brownish granules both inside and outside of the phagocytes, which they interpreted as being particles of gold. The hearts were normal and the lungs showed marked congestion with conglutination of erythrocytes in the vessels. An interesting feature in their animals was an elevated blood sugar content. In the case cited here the fasting blood sugar was 178 mg. per hundred cubic centimeters on successive days, and no part of the patient's history or admission examination suggested hyperglycemia. Both specimens were taken at least ten hours after parenteral fluids had been given.

McCluskey and Eichelberger[10] found that intravenous injections of gold salts in dogs produced diarrhea, albuminuria and vomiting and that the elimination of gold was carried out principally by the kidneys. There was some gold recovered from the stools also.

Goldhammer[11] reports the case of a woman aged 47 treated for chronic rheumatism with intramuscular gold salts. This case terminated fatally in a manner strikingly similar to the one presented here. The total dosage in his case was 0.24 Gm. of Solganol (disodium salt of 4-sulfomethyl-amino-2-auro mercaptophenyl-sulfonic acid) administered in six doses, starting with the low initial dose of 0.01 Gm. The presenting symptoms were weakness, cyanosis and fever. This was followed shortly by erythema, pain in the lower part of the abdomen and frequent watery mucoid stools which later became gray-green and foul smelling. Serum agglutinations and repeated stool cultures were also negative for all known pathogens. Death followed in twelve days after the onset of symptoms in spite of continued supportive measures. The autopsy revealed extensive mucosal edema and hemorrhages in the greater part of the small and the large intestine. There was also atrophy of the parenchymal liver cells. An unsuccessful attempt was made to demonstrate gold in the tissues. This case bears out the statement of Driver and Weller[6] that even small doses of gold given with great care may result in reactions in some cases. Goldhammer's patient and our patient were both women aged 47 treated for chronic rheumatism. The outstanding symptoms were fever and diarrhea, with negative stool cultures and serum agglutinations. The autopsies were also very similar. In our case the initial dose of gold sodium thiosulfate injected was considerably greater than that recommended by the manufacturer, but in Goldhammer's case the initial dose was very small and subsequently carefully controlled.

Perry[12] reports a severe attack of diarrhea with much blood and mucus in the stools in a case under treatment for lupus erythematosus with five injections of gold sodium thiosulfate. The patient recovered in two months after prolonged treatment. Emphasis should be given to the fact that in our case and indeed in other cases reported the symptoms appeared after administration of the drug had been discontinued and, as is so often the case in cinchophen poisoning, progressed to death in spite of treatment. Margolis and Eisenstein[13] in a recent review of gold salt therapy in the treatment of rheumatoid arthritis find that the medical consensus is that it is not sufficiently beneficial to justify the risk involved. They conclude

8. Dr. C. W. Muehlberger made the chemical analysis of the tissues submitted, and Dr. C. M. Flory, of the Department of Pathology, University of Chicago, cooperated in the postmortem examination.

9. Brown, H.; Saleeby, E. R., and Schamberg, J. F.: A Study of Toxic Effects of Certain Gold Compounds, as Indicated by Blood Chemistry and Pathologic Changes in Organs, J. Pharmacol. & Exper. Therap. **28**: 141 (July) 1926.

10. McCluskey, K. L., and Eichelberger, L.: The Effect of Injections of Sanochrysin on Normal and Tuberculous Dogs, Am. Rev. Tuberc. **12**: 329 (Dec.) 1925.

11. Goldhammer, Stefan: Ein Fall von tödlicher Solganal Vergiftung, Med. Klin. **31**: 645 (May 17) 1935.

12. Perry, M. W.: Gold Injections and Colitis, correspondence, J. A. M. A. **113**: 965 (Sept. 2) 1939.

13. Margolis, H. M., and Eisenstein, V. W.: Some Specific Measures in the Treatment of Rheumatoid Arthritis, J. A. M. A. **114**: 1429 (April 13) 1940.

that gold salts offer a promising but at present dangerous therapeutic adjunct to the armamentarium of the practitioner. It seems to us quite obvious that, if this drug is used further, many more reactions and fatalities will occur.

Treatment is largely symptomatic at present. Dextrose and sodium thiosulfate intravenously may be of some value but there is no known specific measure. The administration of liver extract, calcium gluconate and vitamins A, B and C are of questionable value. Cutaneous tests for sensitivity have also proved unreliable in certain cases.

SUMMARY

1. A case of ulcerative enteritis following the intravenous injection of gold sodium thiosulfate was fatal.

2. Clinical and experimental evidence in the literature indicates that mild, severe or fatal reactions occur in a significant percentage of cases so treated; there is no specific antidote or treatment for these reactions.

3. The use of gold salt therapy should be accompanied by full recognition of the many dangers involved.

950 East Fifty-Ninth Street.

CHROMATIC BRAIN SPECIMENS FOR TEACHING

LEE WALLINGFORD DARRAH, M.D., NORTHAMPTON, MASS.

A new method has recently been devised whereby a human brain, or any part of it, can be colored with a small brush and colored inks,[1] causing various important areas of the brain to become immediately recognizable because of the vivid, pleasing color and also because the anatomic name of the part can be lettered on it. The student and others do not find it easy to grabble through the perplexing convolutions and the deeper, more confusing structures, seeking the known brain areas and trying to understand their function.

But if the anterior central gyrus of the hemisphere has been brushed with carmine red ink and then "Leg, Trunk, Arm, Face" lettered on it in black ink; and if the posterior central gyrus is colored green and then the informative word "Sensation" printed on it with a tiny lettering brush,[2] then these immensely important areas are seen at a glance. The motor speech area, or Broca's center, if brushed with yellow ink and "Speech" lettered on it makes brain anatomy still easier and also makes the brain specimen quite attractive. The visual and the auditory areas can also be colored and lettered. Then the mesial surface of the brain hemisphere can be so treated. Coronal sections and cross sections through the basal ganglions are of further help.

TECHNIC FOR MAKING CHROMATIC BRAIN SPECIMENS

Fix the brain specimen in 10 per cent solution of formaldehyde for one month. Remove from the solution, peel off the meninges and then, with a bath towel, wipe the brain specimen as dry as possible without injuring it. Formaldehyde deep in the specimen is sufficient to preserve it and will eventually seep to the surface, replacing the excess formaldehyde which has been wiped off. Protect your hands by working in thin rubber gloves! Place the brain on a sheet of white paper where there is ample light, and all is ready for painting on the colored inks. If one is coloring the motor area, prevent the carmine red from smearing the sensory area by inserting a strip of pliofilm into the central sulcus. To prevent the red from spreading to the temporal lobe below, insert another strip of pliofilm in the sylvian fissure. And while the occipital lobe is being colored green or whatever color you prefer, insert a strip of pliofilm between the occipital lobe and the cerebellum. Color whatever area you like, using hemispheres, coronal and cross sections, and using inks of carmine red, orange red, yellow, green, blue, brown, violet and black. The black is for the lettering. Before lettering let the colored ink dry in a little. Blot it a little or hold the reading lamp close to dry the specimen a bit.

To assist in lettering, wear a binocular loupe.[3] This glass also assists the brain painter in picking out delicate structures in the basal ganglions and in other puzzling sectors. An attractive and helpful specimen can be made by taking a human brain hemisphere and painting the frontal lobe carmine red, the parietal lobe yellow, the occipital lobe violet, the temporal lobe green and the cerebellum brown. The motor, sensory and speech area can then be colored a little differently and lettered.

If the author becomes tired or is interrupted while brain painting he lays the specimen on a sheet of white paper inside an old roasting pan, places alongside the specimen a dish with a sponge soaked with water to prevent the specimen from drying out, and then fits on the lid of the roasting pan and runs a strip of adhesive tape around the edges of the lid. The specimen can be finished a month later, if desired.

One of course is liable to make a mistake in lettering or else may wish to remove a colored ink spot in the wrong place. Ordinary turpentine on a cotton swab will take off the lettering or the colored ink. Then blot the area and start painting again. Begin on a small specimen first. Have a small white pad of paper close by when you begin lettering, so you can try your brush before you letter. The black ink has to be applied very carefully or it will run or mar your specimen. All sorts of color schemes can be worked out to make an anatomic specimen that will make brain anatomy attractive and ever so much easier. When the specimen has been painted and dried sufficiently, seal it in pliofilm.[4] Such a specimen can then be handled by hundreds, will last for many months and can be sent by parcel post, carried in a suit case or left out on an instructor's desk.[5]

From the Northampton State Hospital.

1. Higgins American Waterproof Drawing Inks, Chas. M. Higgins & Co., Inc., 271 Ninth Street, Brooklyn.

2. A small lettering brush, its bristles three-eighths inch long.

3. Beebe binocular loupe, American Optical Company, No. 1603, $3.75.

4. Darrah, L. W.: Sealing Brain Specimens in Pliofilm, Arch. Neurol. & Psychiat. **43**: 1205-1207 (June) 1940.

5. Chromatic Brain Specimens for Teaching were exhibited at the International Association of Medical Museums, Mellon Institute, Pittsburgh, March 20, 1940, American Psychiatric Association, Cincinnati, May 20-24 and the American Neurological Association, Rye, N. Y., June 6-8.

Special Clinical Article

GONORRHEA IN THE MALE

RESULTS OF TREATMENT WITH SULFANILAMIDE

CLINICAL LECTURE AT NEW YORK SESSION

P. S. PELOUZE, M.D., PHILADELPHIA, CHAIRMAN; ROGER W. BARNES, M.D., LOS ANGELES, ANSON L. CLARK, M.D., OKLAHOMA CITY, OSCAR F. FOX, M.D., BOSTON, ROGERS DEAKIN, M.D., ST. LOUIS, FOR THE CLINICAL GROUP AND ROBERT H. ONSTOTT, M.D., LIDA J. USILTON, M.A., AND R. A. VONDERLEHR, M.D., WASHINGTON, D. C., FOR THE U. S. PUBLIC HEALTH SERVICE.

The sudden and dramatic way in which sulfanilamide was launched as a cure for gonorrhea prompted the formation of a committee to study the effectiveness of this drug. A committee composed of five representatives of the American Neisserian Medical Society and representatives from the U. S. Public Health Service initiated a prospective study to evaluate this drug in the treatment of gonorrhea in the male. The collection of records began in May 1939 and was completed in January 1940. A history form for recording clinical observations was furnished the twenty-six cooperating clinicians who offered to pool their records for this study. General instructions were issued to each clinician regarding the uniform execution of the records. In order to compare the effectiveness of sulfanilamide in the treatment of gonorrhea with the results obtained with local therapy only, it was necessary to secure a control series. Existing clinic records were found

Read in the Surgical Division of the General Scientific Meetings at the Ninety-First Annual Session of the American Medical Association, New York, June 11, 1940.

inadequate to serve this purpose. Therefore the records of patients treated with local therapy by the cooperating clinicians in their private practices were used.

A large number of the 3,039 records submitted did not lend themselves to analysis. There were 144 records excluded because essential information such as admission smear or results of two glass tests were not recorded. Of the remaining 2,895 records, 1,208 were of patients who had received previous treatment and, in order that the clinical response might be definitely ascribed to the therapy administered during the study period, these were also excluded.

This left 1,687 case histories of individuals treated with either sulfanilamide, local therapy or both and to whom no previous treatment had been administered. Of these, 390 patients were followed for less than fifteen days. In evaluating the results of treatment these short time cases have been omitted, since they were under observation for too short a period to evaluate results.

No attempt was made to limit the study to records of patients who had maintained a certain schedule of treatment or for whom clinical and laboratory observation had been made at regular intervals. Since in most clinic practice there is little or no periodicity of smear and culture work, throughout the analysis the two glass test has been used as a major criterion of results of treatment. Patients with a two week period during which there were at least three observations showing a negative two glass test were classified as having a "remission." The degree of reliability of the two glass test as a criterion of remission was estimated in terms of the relapses and ultimate clinical results obtained in remissions based on the two glass test only as compared with those in which the two glass test was substantiated by smears, cultures or both.

LAPSES

Over 60 per cent of the 1,687 previously untreated patients disappeared from observation before they had obtained a remission status. Nearly 45 per cent of them disappeared before the forty-ninth day. Table 2 depicts the rate at which these patients lapsed. To correct for these lapses in the calculation of remission rates the analyses have been made in terms of patients under observation during relatively short time periods up to forty-nine days.

REMISSIONS

Of the 965 patients treated with sulfanilamide and under observation fifteen days or longer 871 received local therapy, also, leaving only ninety-four who had received sulfanilamide alone. The control group consisted of 332 patients treated with local therapy only.

Since all patients with gonorrhea will ultimately have a remission and cure, the evaluation of the effectiveness of any type of therapy depends on the speed with which good results are obtained.

The three groups of cases were compared as to the speed and extent to which they obtained satisfactory results. These satisfactory results are expressed in two ways: "maintained remission" and end clinical result. The maintained remissions exclude those patients who obtained "remissions" but subsequently gave evidence of abnormality in the two glass test or were found to be bacteriologically positive. In determining remission rates the follow-up periods of all patients analyzed were examined out to fifty days and an expected "relapse" rate calculated for each time interval. The expected relapse rate indicates the number of relapses which would have occurred had all patients been followed for fifty days after obtaining a remission. These expected relapses were then subtracted from the total remissions to obtain the maintained remissions.

It was found that many patients not fulfilling the criteria for remission or who relapsed after remission were classified on termination of the case as having a satisfactory clinical result within the fifty day treatment observation period. Except for the relapses, these were for the most part patients who had scattered shreds in the first glass and yet were bacteriologically negative, or in whom the period of negativity did not quite reach the necessary fourteen day period.

TABLE 1.—*Rate of Appearance of Maintained Remissions and Total Satisfactory Results Showing Method of Therapy*

Time After Admission	Local Only		Sulfanilamide Only		Sulfanilamide Plus Local	
	Maintained Remissions	Total Satisfactory Results	Maintained Remissions	Total Satisfactory Results	Maintained Remissions	Total Satisfactory Results
15-19 days.....	1.8%	2.1%	5.3%	7.4%	11.7%	12.9%
20-29 days.....	8.3	9.8	13.8	18.0	26.9	30.4
30-39 days.....	15.9	20.3	17.2	22.8	35.7	41.5
40-49 days.....	25.2	32.3	24.7	31.6	44.9	53.4

An example of the method used to calculate the material in this table follows: Under sulfanilamide plus local therapy, there were 871 cases under observation during the fifteen to nineteen day interval. During this period 125 patients finished a two week period during which the two glass test was negative. Of these 125 remissions, twenty subsequently relapsed. These relapses were arranged according to the time the relapse occurred after remission and the proportion of relapses was calculated for the remissions under observation in each time interval: In from one to four days after remission, two out of 122 remissions relapsed; at five to nine days, five out of 114 relapsed; at ten to fourteen days, two out of 102 relapsed; at fifteen to nineteen days, four out of ninety-two relapsed; at twenty to twenty-nine days, one out of seventy-five relapsed; at thirty to thirty-nine days, four out of fifty-nine relapsed; and at forty to forty-nine days none out of forty relapsed. The resultant percentages of relapse in these respective time intervals were 1.6, 4.4, 2.0, 4.3, 1.3, 6.8 and 0.0.

These proportions were then cumulated on a basis of 1,000 cases at risk as follows: In the one to four day period of 1,000 remissions 1.6 per cent, or sixteen, relapse, leaving 984 remissions entering the five to nine day period. Of these 984 remissions, 4.4 per cent, or forty-three, relapse, leaving 941 remissions entering the ten to fourteen day period. Of these 941 remissions, 2.0 per cent, or nineteen, relapse, leaving 922 remissions entering the fifteen to nineteen day period. Of these 922 remissions, 4.3 per cent, or forty, relapse, leaving 882 remissions entering the twenty to twenty-nine day period. Of these 882 remissions, 1.3 per cent, or eleven, relapse, leaving 871 remissions entering the thirty to thirty-nine day period. Of these 871 remissions, 6.8 per cent, or fifty-nine, relapse, leaving 812 remissions entering the forty to forty-nine day period. Of these 812 remissions there were no relapses during the forty to forty-nine day period, leaving 812 remissions at the end of forty-nine days. When these relapses were cumulated there were 1.6 per cent by the fourth day, 5.9 per cent by the ninth day, 7.8 per cent by the fourteenth day, 11.8 per cent by the nineteenth day, 12.9 per cent by the twenty-ninth day, 18.8 per cent by the thirty-ninth day and 18.8 per cent at the forty-ninth day.

This relapse rate of 18.8 per cent was then applied to the 125 remissions obtained in the fifteen to nineteen day interval and the resultant expected relapses (twenty-three) subtracted, leaving 102 maintained remissions, or 11.7 per cent of the original 871 cases under observation during the interval.

The original 125 remissions and nineteen lapses occurring during the fifteen to nineteen day interval were then subtracted from the 871 original cases under observation, leaving 727 cases entering the twenty to twenty-nine day interval. The same procedure was then followed for this twenty to twenty-nine day interval as in the fifteen to nineteen day interval, and in turn for the thirty to thirty-nine, and the forty to forty-nine day intervals. The resultant proportions of maintained remissions determined for each interval were fifteen to nineteen days, 11.7 per cent; twenty to twenty-nine days, 17.2 per cent; thirty to thirty-nine days, 12.1 per cent; forty to forty-nine days, 14.3 per cent. When these proportions were cumulated on the same basis as the cumulated relapse rates, the cumulative remission rates shown in table 1 were found.

The same method was used to derive the rates of appearance of "Total Satisfactory Results."

Within fifteen to nineteen days after beginning treatment, maintained remissions were obtained by local treatment in only 2 per cent of the cases (table 1) as compared with 5 per cent by sulfanilamide therapy and 12 per cent when local therapy was given in addition to sulfanilamide. The addition of those cases obtaining a clinically satisfactory result without fulfilling the criteria for remission does not materially increase these percentages. When the time interval of forty to forty-nine days is reached, sulfanilamide plus local therapy has obtained a cumulative maintained remission rate of 45 per cent, as compared with 25 per cent for sulfanilamide alone and 25 per cent in the cases treated by local

therapy alone. When patients obtaining a clinically satisfactory result within forty to forty-nine days are added, satisfactory results are increased to 53 per cent, 32 per cent and 32 per cent, respectively. Thus, both maintained remissions and end satisfactory results are significantly better within fifty days of treatment observation under sulfanilamide plus local therapy than when either sulfanilamide alone or local therapy are used. Sulfanilamide alone obtained a higher proportion of good results within the first month of treatment than did local therapy. After this period there was little difference in the effectiveness of the two methods.

Speed of obtaining satisfactory results is the real test in determining the effectiveness of different types of treatment. By the nineteenth day, sulfanilamide plus local therapy obtained over six times as many maintained remissions as local therapy and over twice as many as sulfanilamide alone. This rapid remission rate with sulfanilamide and local therapy is the more significant because it means that before the nineteenth day all these patients had had a two week period in which they were symptom free.

SCHEDULE OF SULFANILAMIDE THERAPY

With this evidence that sulfanilamide, either alone or in combination with local therapy, succeeded in obtaining better results before the thirtieth day, an analysis was made of the intensity of the sulfanilamide treatment within this time.

There was no significant difference in the results obtained within this important first month if sulfanilamide was given so that the patient received at least 400 grains (26 Gm.) of drug within seven days, as compared with those in whom this amount of drug was administered continuously over a twenty-one day period (30 per cent as against 29 per cent). A small number of patients treated with very low doses of less than 400 grains of the drug in a twenty-one day period obtained satisfactory results in only 5 per cent of patients by the thirtieth day. This is less than but not significantly different from the remission obtained with local therapy only.

RELIABILITY OF TWO GLASS TEST

How valuable is the two glass test in reflecting the clinical status of the disease? This study shows that the two glass test can be persistently negative for a period of at least two weeks and subsequently become positive. In fact, in 175 cases with "remissions" based on the two glass test alone, 29 per cent subsequently relapsed (table 3). Half of these relapses were found in the two glass test but the other half would not have been detected without the use of cultures. This high relapse rate is in distinct contrast to that existing when the two glass test is supported by negative smears and cultures. In 275 such cases there were only four, or 1.4 per cent, relapses. Of these, three were found only by subsequent culture, while the two glass test remained negative. The two glass test is a valuable guide to the progress of the case under treatment, but, if it is unsupported by laboratory evidence, one out of three cases will subsequently relapse. If the two glass test is supported by smears, one out of twenty will relapse, and, if followed by both negative smears and cultures, only one out of 100 may be expected to relapse.

TABLE 2.—*Rates of Lapse According to Length of Treatment Observation Period*

Days After Admission	Total Patients	Lapse	Maintained Remission	Proportion of Patients Lapsing Before End of Interval
Under 6	1,687	248	0	14.7 per cent
6-14	1,439	142	0	23.1 per cent
15-19	1,297	62	113	26.8 per cent
20-29	1,122	111	153	33.4 per cent
30-39	858	86	89	38.5 per cent
40-49	683	85	88	43.5 per cent
50 plus	510	298	212	61.2 per cent
Total	1,632		655	

TABLE 3.—*Reliability of Two Glass Test in Terms of Relapse and Clinical Outcome*

Remission Based on Two Week Period of Negative Two Glass Test with	Remissions		Relapses		Maintained Remissions		Remissions Clinically Satisfactory	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
No smear or culture								
Local	25	100.0	5	20.0	20	80.0	23	92.0
Sulfanilamide	6	100.0	1	16.7	5	83.3	6	100.0
Sulfanilamide and local	144	100.0	44	30.6	100	69.4	127	88.2
Total	175	100.0	50	28.6	125	71.4	156	89.2
Smear or culture *								
Local	140	100.0	2	1.4	138	98.6	139	99.3
Sulfanilamide	12	100.0	1	8.3	11	91.7	11	91.7
Sulfanilamide and local	157	100.0	15	9.6	142	90.4	151	96.2
Total	309	100.0	18	5.8	291	94.2	301	97.4
Smear and culture								
Local	17	100.0	..	...	17	100.0	17	100.0
Sulfanilamide	7	100.0	..	...	7	100.0	7	100.0
Sulfanilamide and local	251	100.0	4	1.6	247	98.4	251	100.0
Total	275	100.0	4	1.4	271	98.6	275	100.0
Total								
Local	182	100.0	7	3.9	175	96.1	179	98.4
Sulfanilamide	25	100.0	2	8.0	23	92.0	24	96.0
Sulfanilamide and local	552	100.0	63	11.4	489	88.6	529	95.8
Grand total	759	100.0	72	9.5	687	90.5	732	96.4

* Only five of these 309 cases had substantiating cultures before relapse; the remaining 304 were substantiated by smears.

REACTIONS

Of 1,627 patients treated with sulfanilamide, either with or without local therapy and irrespective of previous treatment, 534 reactions were recorded as occurring in 414 patients. None of these reactions were classified as severe. Over one half of them were nervous manifestations such as insomnia, vertigo, tinnitus, headache or transient disorientation. Another fourth of the reactions were classified as gastrointestinal —anorexia, nausea, vomiting or diarrhea. Only 9 per cent of the patients were reported as having cyanosis or secondary anemia.

SUMMARY

In this study, designed to evaluate the efficacy of sulfanilamide in the treatment of gonorrhea in the male, it was found that by the end of the forty-ninth day nearly 45 per cent of the patients had lapsed from the clinics before obtaining as much as a two week period during which the two glass test was negative.

It was found that the use of sulfanilamide materially enhanced the satisfactory results early in the course of the treatment period. Sulfanilamide plus local therapy was over six times as effective in producing remissions as was local therapy alone in those cases followed during the fifteen to nineteen day interval. At the same time, sulfanilamide alone was twice as good as was local treatment alone. By the forty-ninth day, sulfanilamide plus local therapy had obtained nearly twice as many good results as did either local therapy alone or sulfanilamide alone.

If the amount of sulfanilamide given was more than 400 grains in seven days, the results were no better than if the amount administered was less than 400 grains in seven days but more than 400 grains in twenty-one

days. If less than 400 grains was given in twenty-one days, sulfanilamide plus local therapy was no better than local therapy alone.

A two week period of negative two glass tests unsupported by either a negative smear or a culture was a poor criterion of good results. Nearly one third of these patients subsequently had clinical or bacteriologic evidence of the disease. When the two week period of negative two glass tests was supported by a negative smear, only one out of twenty remissions relapsed and, when supported by both negative smears and cultures, ninety-nine out of 100 were still negative on discharge or lapse from the clinic.

Although sulfanilamide was found to be of considerable value in the treatment of the disease, if left much to be desired, since at the end of one month only 30 per cent of cases under the best type of treatment had obtained a maintained remission.

CONCLUSIONS

1. The use of sulfanilamide in the treatment of gonorrhea in the male is effective in producing a higher proportion of early clinical responses than does the use of local therapy alone.

2. Under the best circumstances, sulfanilamide plus local therapy accomplishes 30 per cent good results within the first month, as compared with 8 per cent for local therapy alone.

3. The two glass test, unsupported by either smears or cultures, while a useful clinical guide, is an unreliable index of satisfactory outcome.

COMMENT

The most striking fact that this study reveals is a high dispensary lapse rate. In some of the dispensaries participating in the study, this lapse rate was 100 per cent—that is, none of the patients were held under treatment or observation long enough to attain even a two week period in which the two glass test was negative. In few clinics was the lapse rate less than 50 per cent. This high dispensary lapse rate may go far in explaining why gonorrhea is such a widespread disease. The committee feels that there is an urgent need for an immediate correction of these shortcomings if the control of gonorrhea among dispensary patients and their contacts is to advance. It is now well recognized that if sulfanilamide is effective in the treatment of gonorrhea the patient will show a prompt response. Certainly by the fourteenth day he should be free from discharge and have a negative two glass test. In this study, those cases would fall in the remissions occurring between twenty and twenty-nine days, and in that group sulfanilamide plus local therapy had effected remissions in approximately 27 per cent of cases as against 8 per cent for local therapy without sulfanilamide. Thus, this prompt clinical response may be expected in about three out of ten patients treated with sulfanilamide plus local therapy, as against one out of ten treated with local therapy only.

In the later time intervals sulfanilamide plus local therapy continued to obtain better responses than did local therapy alone. If the hypothesis is true that the effectiveness of sulfanilamide rapidly decreases with time, a possible explanation for this observation may be that those patients receiving sulfanilamide in addition to local therapy came into the period when local therapy begins to produce effects in a much better clinical condition than did those patients who did not have sulfanilamide.

If a patient has not shown a substantial clinical response within the first week of treatment under sulfanilamide, it should be discontinued; and, further, the administration of sulfanilamide for more than three weeks serves no good purpose. It is felt that repeat courses of sulfanilamide are rarely effective after an initial failure, although the substitution of another sulfonamide may be quite effective. These opinions are based in part on the results of this study, additional evidence in the literature, and the clinical experience of each member of the committee.

As a large proportion of cases relapse after having had a remission based only on the two glass test, and since almost one half of the relapses occurring in the study were found by smear and culture in spite of a negative two glass test, a far wider use of smear and culture studies should be employed in tests of cure. This is, of course an ideal which will be difficult to attain. The fragility of the gonococcus between the time of taking specimens and the implanting on cultural mediums makes it unpractical at the present time to utilize a laboratory far removed from the clinic. Until improved technics have been developed to eliminate this deficiency, more attention should be given to developing reliable criteria of cure other than those including cultures.

Since this study was begun, considerable evidence has accumulated in the literature which indicates that there are other sulfonamide compounds which are decidedly superior to sulfanilamide in the treatment of gonorrhea. This, together with the fact that the use of sulfanilamide as depicted in this study is so disappointing, leads us to believe that whenever public funds are expended for sulfonamide drugs they should be used to purchase those of proved greater efficacy.

Council on Physical Therapy

THE COUNCIL ON PHYSICAL THERAPY HAS AUTHORIZED PUBLICATION OF THE FOLLOWING ARTICLE.

THE COUNCIL DESIRES TO EXPRESS ITS APPRECIATION TO DR. PAUL E. SABINE FOR THE PREPARATION OF THIS ARTICLE AND TO THE CONSULTANTS ON AUDIOMETERS AND HEARING AIDS FOR THEIR ASSISTANCE. THE CONSULTANTS ON AUDIOMETERS AND HEARING AIDS ARE DRS. C. C. BUNCH, GEORGE M. COATES, EDMUND P. FOWLER, ISAAC H. JONES, DOUGLAS MACFARLAN, C. STEWART NASH, HORACE NEWHART, BURT R. SHURLY AND WILLIAM P. WHERRY.

HOWARD A. CARTER, Secretary.

ACCEPTANCE TESTS OF HEARING AIDS

PAUL E. SABINE, PH.D.

GENEVA, ILL.

There are two questions which the prospective purchaser of a hearing aid wants answered. The first is "What type of instrument and what particular make of instrument will give me most nearly normal hearing?" This question settled, the second one is "Does the particular instrument which best meets my hearing needs have serious defects of a practical nature that would make its purchase inadvisable?"

The answer to the first question involves two factors: (*a*) the specific hearing defects which the hearing aid is designed to remedy and (*b*) the adaptability of the instrument to the correction of these defects. In the comparable case of defective vision the procedure is obvious. The patient first goes to a competent ophthalmologist, who employs established methods of measurement to determine the source and nature of the difficulty. He can then prescribe the curvature of the lenses that

will give the needed correction. This prescription is filled by a competent optician. The patient returns to the ophthalmologist, who by further measurements checks the finished lenses to insure that his prescription has been carried out. A corresponding procedure is the ideal to be attained in the case of defective hearing.

Unfortunately, the present state of both otologic testing and the art of producing hearing aids of prescribed characteristics leaves us far from this ideal. The development of the telephonic hearing aid using the carbon transmitter has come within the memory of living man, and only within the last ten years have manufacturers been able to achieve any measurable success in controlling the pitch characteristics of these instruments. The degree of sound amplification with wearable instruments of this type has been limited. The later type of aid embodying the vacuum tube principle of electrical amplification, together with the crystal type microphone and receiver, has come within recent years. Theoretically the pitch characteristics of this latest type of instrument are controllable, but consideration of size and the frequency response of both microphone and receiver impose serious limitations on this control.

The electrical hearing aid is a somewhat complicated piece of physical apparatus as contrasted with the simple lens for the correction of defective vision. Hence in order to come within the price range of the buying public it must be produced in quantities, as contrasted with the lenses which the optician grinds to individual order. Moreover, the manufacture of successful hearing aids calls for a vast deal of scientific investigation and technical development, which add to the cost of production in the present state of the art and accordingly to the price which the purchaser must pay. As a result, at present the electrical hearing aid is for the ordinary pocketbook an expensive piece of personal equipment and it meets with considerable sales resistance. This situation tends to produce high powered advertising and high pressure sales methods on the part of the manufacturers and distributors and presents a strong temptation for commercially exploiting the misfortune of the hard of hearing.

In this situation the medical profession and reputable manufacturers of hearing aids both recognize a responsibility to the user of hearing aids.

To meet this responsibility, the Council on Physical Therapy has appointed a group of consultants. The purpose of this group is to investigate as fully as possible, under the circumstances, hearing aids that are offered to the hard of hearing public. In this investigation no attempt is made to rate the merits of an instrument on any absolute basis or to evaluate the relative merits of different instruments, since the hearing improvement in any given case will depend on the type and degree of hearing impairment as much as on the characteristics of the instrument used. The precise results of any practical tests with hard of hearing subjects will also depend on these personal factors. On the other hand, the results of purely physical measurements will depend on the type and methods of measurements employed, and the interpretation of these results in terms of hearing improvement in any particular case is open to question.

It has therefore been the policy of the consultants to limit their investigations of instruments submitted by manufacturers to the directly ascertainable facts, such as the size, weight and shape of the various parts, the voltages and current drains of the batteries, and consideration of the mechanical features and construction of the instrument. Obvious electrical defects such as excessive internal noise and "feed back" causing the instrument to "squeal" under normal conditions of use are noted. Measurements are made to determine the frequency range over which the instrument shows appreciable sound intensity amplification. Articulation and intelligibility tests, using standard syllable and sentence lists spoken at conversational level at a distance of 5 feet in a quiet room, are made as a means of forming a qualitative judgment of the performance of the instrument under conditions of normal use. Consideration is given to all these factors by the consultants in forming a judgment as to the acceptability of each instrument submitted. At the same time, advertising matter is scrutinized for exaggerated statements, as well as for claims clearly beyond the demonstrable performance of the instrument.

The foregoing does not constitute an exhaustive investigation of the instrument. The consultants are of the opinion, however, that the data thus secured are sufficient to warrant a judgment as to whether the instrument in question can be properly designated as a "hearing aid," in the commonly accepted meaning of the term, in view of the present state of the art. The standard of acceptance has of necessity to be more or less relative. Every effort is made, however, to insure that it is not variable as between instruments that are now on the market. The consultants strongly urge that such figures as are given in their published report be not used as the basis for comparing the merits of different instruments, since the tests are not sufficiently exhaustive to warrant the use in this way of their quantitative results.

"Acceptance" of a hearing aid by the Council and consultants therefore does not carry with it any recommendation for its use in any specific case. It does not mean that all hard of hearing subjects will be benefited by its use. It does mean, however, that the "acceptable aid" has been examined by a competent and unbiased investigator, that it is well made and free from serious mechanical and electrical defects and that it produces sufficient amplification of sound intensity in the frequency range required for the understanding of speech so that it may be rated as a practical aid to hearing. Further, it means that the consultants have examined the advertising matter submitted and that it is free from extravagant and unwarranted claims for the instrument examined.

The first question of the prospective user of a hearing aid as to which of the various instruments that he may buy will most nearly meet his particular needs can best be answered by diagnosis by a competent otologist after careful audiometric tests. Such a diagnosis will answer the question as to whether the air receiver or the bone receiver instrument is likely to yield the better results but not necessarily which will be the more acceptable to the patient; it will also answer the question as to what portion of the frequency range appears to require the greatest amplification in order to supply best the patient's individual defects. The otologist is not in a position today to "fit" the patient's ears with the precision with which an ophthalmologist might "fit" his eyes, but much better results can be secured by friendly cooperation between the otologist and the hearing aid dealer than by the hit or miss method of trying everything in sight and buying on the basis of the most persuasive salesmanship.

Council on Pharmacy and Chemistry

PRELIMINARY REPORT OF THE COUNCIL

THE COUNCIL HAS AUTHORIZED PUBLICATION OF THE FOLLOWING PRELIMINARY REPORT.

PAUL NICHOLAS LEECH, Secretary.

ACETYLGLYCARSENOBENZENE

(Sodium 3-4′ diacetylamino-4-hydroxyarsenobenzene-2′ glycolate)-Winthrop

PRELIMINARY REPORT OF THE COUNCIL ON PHARMACY AND CHEMISTRY

Acetylglycarsenobenzene (sodium 3-4′ diacetylamino-4-hydroxyarsenobenzene-2′ glycolate) was submitted for the Council's consideration as proposed for use in the treatment of syphilis. The Winthrop Chemical Company informed the Council that the product is not yet under commercial production pending completion of studies now being carried on. The firm also informed the Council that the product had been designated as "S. S. 371" during its investigational period and that it has been known abroad as "Solu-salvarsan." The firm at this time presented no proprietary name for the Council's consideration. It pointed out that the designation "Acetylglycarsenobenzene" has been recognized by the National Institute of Health.

It is a yellow, odorless powder, readily soluble in water, containing 28.30 per cent of arsenic.

Administered intramuscularly it is reported to be well tolerated by both animal and man and in albino rats to be tolerated systemically: 400 mg. per kilogram of body weight when given intravenously and 500 mg. per kilogram intramuscularly.

Its therapeutic index is reported to exceed 30. Excretion studies have shown that the peak of excretion in cats occurs in the first twenty-four hours and fecal by the third to fourth day. In dogs the urinary peak of excretion occurred on the second day and in three normal human beings who received at three day intervals two intramuscular injections of 175 mg. each of the products 21.5 per cent of the arsenic was excreted the first day, 31.7 per cent in three days and 34.8 per cent in fourteen days.

A clinical report of two years' study made by Guy, Goldmann, Gannon and Slone revealed that the product seemed to have reasonable therapeutic qualities but that its toxicity for man was high. In the discussion that followed it was shown that the combined material studies at the University of Pittsburgh, University of Maryland and the Johns Hopkins University Syphilic Clinics comprised some 235 cases in which twenty-eight severe reactions were noted, there being eighteen sensitization dermatitides, including several cases of dermatitis exfoliativa, three cases of icterus, three blood dyscrasias, one nephrosis and one hemorrhagic encephalitis with death.

An efficient painless arsenical that could be used intramuscularly in the treatment of syphilis would be of great value. Toxicologic and therapeutic tests of the drug under the name of Solu-salvarsan were made on behalf of the therapeutic trials committee of the Medical Research Council, reported by L. W. Harrison (*Brit. Ven. Dis.* **15**:203 [July] 1939). These investigators found that it was not as effective as neoarsphenamine. Examination of tissue juices from primary lesions following an injection of the preparation showed that organisms might be found even as long as six days afterward. In some cases the intramuscular injections were quite painful and reactions following its use were far from rare, many of them being severe, even with resulting death.

The Council held that further perfection of this compound is necessary before it can be generally used in man. The Council expressed its approval of the conservative manner in which the Winthrop Chemical Company has studied this compound before even considering its commercial production. It appears that to each clinic which tried the drug the Winthrop Chemical Company explained that nothing would be done with the product from a marketing standpoint before it had been found to be satisfactory not only from a therapeutic standpoint but also from the standpoint of low incidence of reactions. The Council voted to postpone consideration of Acetylglycarsenobenzene.

Council on Foods

ACCEPTED FOODS

THE FOLLOWING ADDITIONAL FOODS HAVE BEEN ACCEPTED AS CONFORMING TO THE RULES OF THE COUNCIL ON FOODS OF THE AMERICAN MEDICAL ASSOCIATION FOR ADMISSION TO ACCEPTED FOODS.

FRANKLIN C. BING, Secretary.

CANNED AND DRIED FRUITS AND FRUIT PRODUCTS (*See* Accepted Foods, 1939, p. 70).

The Appella Corporation, Selah, Wash.

APPELLA APPLE CRISPS, dried granules of steamed, cored peeled apples.

Analysis (submitted by manufacturer).—Moisture 0.2%, total solids 99.8%, ash 2.0%, fat (ether extract) 2.1%, protein (N × 6.25) 1.0%, crude fiber 4.5%, reducing sugars before inversion 52.0%, sucrose [(total reducing sugar after inversion minus reducing sugars) × 0.95] 17.5%, pectin (alcohol precipitate) 9.6%, total carbohydrates other than crude fiber (by difference) 90.2%, total acidity (as malic acid) 2.7%, total sulfurous acid 0.01%, sodium (Na) 0.11%, potassium (K) 0.87%, calcium (Ca) 0.015%, magnesium (Mg) 0.029%, copper (Cu) 0.0008%, iron (Fe) 0.0125%, phosphorus (P) 0.0014%, chloride 0.216%, manganese (Mn) absent, total sulfur (S) 0.137%, silica (SiO_2) 0.005%, arsenic (As) 0.0008 grain per pound, lead (Pb) absent.

Calories.—3.8 per gram; 98 per ounce.

FRUIT JUICES INCLUDING TOMATO JUICE (*See* Accepted Foods, 1939, p. 48).

American Grape Juice Corporation, Fredonia, N. Y.

FREEDOM BRAND GRAPE JUICE UNSWEETENED, bottled pasteurized grape juice prepared from Concord grapes.

Analysis (submitted by manufacturer).—Moisture 82.6%, total solids 17.4%, ash 0.23%, alkalinity of ash (cc. N/10 Acid per 100 Gm.) 30.4 cc., acidity as tartaric acid 1.1%, protein (N × 6.25) 0.3%, fat 0.13%, carbohydrate (by difference) 16.7%, sugar (before inversion as invert sugar) 14.4%, sugar (after inversion as invert sugar) 14.5%, sucrose negligible. Tests of lead and arsenic show that the product complies with Council requirements for freedom from toxic spray residues.

Calories.—0.7 per gram; 16 per ounce.

TAFT'S BRAND GRAPE JUICE UNSWEETENED, same as Freedom Brand Grape Juice Unsweetened.

PREPARATIONS USED IN THE FEEDING OF INFANTS (*See* Accepted Foods, 1939, p. 156).

Harold H. Clapp, Inc., Rochester, N. Y.

CLAPP'S CHOPPED PINEAPPLE RICE DESSERT WITH RAISINS, a canned cooked mixture of milk, pineapple, rice, sucrose, seedless raisins, sodium chloride and vanilla extract.

Analysis (submitted by manufacturer).—Moisture 77.5%, total solids 22.5%, ash 0.59%, fat (ether extract) 1.2%, protein (N × 6.25) 2.4%, crude fiber 1.7%, carbohydrate other than crude fiber (by difference) 16.6%, calcium (Ca) 65.1 mg. per 100 Gm., phosphorus (P) 53.6 mg. per 100 Gm., iron (Fe) 2.2 mg. per 100 Gm., copper (Cu) 0.08 mg. per 100 Gm.

Calories.—0.87 per gram; 25 per ounce.

SUGARS AND SYRUPS (*See* Accepted Foods, 1939, p. 324).

Union Sugar Company, San Francisco.

UNION BRAND SUGAR, granulated beet sugar.

Analysis (submitted by manufacturer).—Moisture 0.03%, ash 0.01%, fat none, protein none, sucrose 99.9%, reducing sugars trace, crude fiber none, sulfites expressed as sulfur 3.0 parts per million.

Calories.—4 per gram; 114 per ounce.

UNCLASSIFIED AND MISCELLANEOUS FOODS, PEANUT BUTTER (*See* Accepted Foods, 1939, p. 381).

Good Foods, Inc., Minneapolis.

SKIPPY BRAND PEANUT BUTTER CREAMY STYLE, ground peanuts, the oil of which has been extracted, hydrogenated and then mixed with the peanuts, sugar and sodium chloride.

Analysis (submitted by manufacturer).—Moisture 0.4%, total solids 99.6%, ash 3.1%, fat (ether extract) 49.1%, protein (N × 6.25) 30.8%, crude fiber 0.9%, carbohydrates other than crude fiber (by difference) 11.3%.

Calories.—6.3 per gram; 179 per ounce.

SKIPPY BRAND PEANUT BUTTER CHUNK STYLE, same as Skippy Brand Peanut Butter Creamy Style except that one-eighth inch particles of roasted peanuts have been added.

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

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SATURDAY, NOVEMBER 9, 1940

DEDICATION OF THE NATIONAL INSTITUTE OF HEALTH

On October 31 the new buildings of the National Institute of Health at Bethesda, Md., were dedicated at an occasion which marks a new epoch in the growth and development of the United States Public Health Service. The contribution of seventy acres of land by Mr. and Mrs. Luke I. Wilson, who wrote to the President in 1935 offering a portion of their estate for the benefit of scientific research, was the first step in this development. The creation of the National Cancer Institute by an act signed by the President, Aug. 5, 1937, was a second step. Now through cooperation of the Federal Works Agency, the Public Buildings Administration and the United States Public Health Service this new structure is added to our national facilities. From the small service laboratory building in 1890 with its meager facilities and infinitesimal support, this aspect of the work of the United States Public Health Service has grown to the great accomplishments of today with a great estate, magnificent buildings and opportunity for expansion. The contribution of the United States Public Health Service to our knowledge of yellow fever, Rocky Mountain spotted fever, pellagra, industrial diseases, tularemia, malaria, psittacosis and many other medical problems and its contributions in the standardization of serums, antitoxins, vaccines and surgical sutures are recognized by every physician as fundamental to the high quality of medical service available in our country.

Noteworthy in the address on this occasion was the statement by President Franklin Delano Roosevelt. After recognition of the significance of medicine and public health in national defense, the President said:

> We have recognized the strategic importance of health by the creation of a Health and Medical Committee in the Council of National Defense whose job it is to coordinate the health and medical aspects of national preparedness. This committee is assisting the government in the mobilization of the medical and health resources of the country to serve the best interests both of the military and the civilian elements of the nation.

He pointed out the need for cooperation from all the various phases and activities in the field of medicine and he continued:

> Neither the American people nor their government intend to socialize medical practice any more than they plan to socialize industry. In American life the family doctor, the general practitioner, performs a service which we rely upon and trust.
>
> No one has a greater appreciation than I of the skill and self sacrifice of the medical profession. And there can be no substitute for the personal relationship between doctor and patient which is a characteristic and a source of strength of medical practice in our land.

He paid a tribute to the high status of medical science in the United States and to the part played by the Public Health Service in this advancement. He concluded:

> Today the need for the conservation of health and physical fitness is greater than at any time in the nation's history. In dedicating this institute, I dedicate it to the underlying philosophy of public health; to the conservation of life, to the wise use of the vital resources of our nation.

The medical profession of the United States congratulates the United States Public Health Service on this addition to the other great structures which it administers. The medical profession recognizes the necessity for an official agency of this type whose wise leadership may well be a constant stimulus to medical advancement and to cooperation among city, county and state agencies also concerned with public health problems.

SEROLOGIC TESTS FOR SYPHILIS AND SELECTIVE SERVICE

Last week THE JOURNAL pointed out that the new regulations regarding serologic examination for syphilis of men coming under the Selective Service Act were unique and not duplicated as far as we knew in any other country or by this country in any previous emergency. The editorial concluded with the statement that those who have syphilis with remedial manifestations would apparently be placed in Class 1-A, the group considered to be qualified for general military service. An exception, of course, would be made for those with cerebrospinal, cardiovascular or visceral syphilis. The statement concluded by saying that presumably the decision as to how much attention would be given to the presence of syphilis would rest with the military authorities after induction into the service. Coincident with the publication of this editorial, a telegram was sent to the Selective Service headquarters, inquiring as to whether or not men selected under Selective Service with two positive Wassermann tests would be classified for induction, deferred or rejected, provided they did not have cerebrospinal, cardiovascular or visceral syphilis. The telegram was considered necessary because of the apparent discrepancy that existed between the regulation that a Wassermann test should be given each man examined and that another test should be made provided the first test was positive. A reply was received some days later

from Mr. Dykstra, now Director of Selective Service; his telegram read:

> No man with acute or chronic venereal disease will be used for military service. For administrative purposes Selective Service will consider two positive serological tests performed within three months to be evidence of latent syphilis and to be cause for rejection.

In THE JOURNAL last week the regulations regarding genito-urinary organs and venereal diseases, as published on page 1557, indicate that acute or chronic gonorrhea and syphilis with remedial manifestations, except cerebrospinal, cardiovascular or visceral syphilis, would involve placing the registrant in Class 1-A for general military service. The new telegram from Mr. Dykstra indicates that one positive Wassermann test would probably require that the registrant be deferred until a second test within three months, and that a second positive test within three months would involve rejection.

In this connection, attention is called to the article in this issue of THE JOURNAL by Moore, Eagle and Mohr, on page 1602, in which they report that they have seen at least forty examples of false positive tests for syphilis either in normal persons or in those with various diseases during the last two or three years. The recognition of false positive serologic tests is especially important in view of the decision to reject for military service registrants with two positive serologic tests for syphilis. A procedure suggested for differentiation of false positive from positive reactions actually due to syphilis appears on page 1604 of this issue.

EXPERIMENTAL HUMAN SCURVY

Physicians who serve as their own experimental animals for the elucidation of medical problems are not infrequent; they always arouse admiration and appreciation, however, even when martyrdom may not be involved. A recent example of such self experimentation is the production and thorough study of an induced case of human scurvy. The observations were made at Harvard University by Crandon, Lund and Dill;[1] the first named, an assistant in surgery at the Harvard Medical School, was the experimental subject. The diet was carefully prepared and was completely deficient in vitamin C but adequate in every other respect. Crandon spent a period of six months on this diet. While two other studies on experimental human scurvy are cited, one was not controlled and the other lasted for only a few days. This study is therefore the first in which a human being has remained on a controlled diet deficient only in vitamin C for this length of time.

During this experiment the plasma content of ascorbic acid fell to a low level within ten days and disappeared in thirty days; after 132 days on the vitamin C deficient diet the first abnormal objective clinical sign was observed. In other words, the plasma ascorbic acid level was zero for thirteen weeks before the first clinical evidence of scurvy appeared. The vitamin C content of the white cell-platelet layer of centrifuged blood could be correlated much more directly with development of the disease; i. e., this value fell to zero shortly before the development of clinical scurvy. It would therefore seem that determination of the ascorbic acid level of the white cell-platelet layer of the centrifuged blood rather than of the plasma would constitute a more accurate laboratory method for the detection of incipient scurvy. Another early sign was the finding of interruption of the lamina dura in x-ray films of the teeth; however, objective dental manifestations were not observed and biopsy of the gingiva even at the end of the six month period was negative.

The earliest clinical manifestations of scurvy were hyperkeratotic papules, which were noted after 132 days on the vitamin C deficient diet; the perifollicular hemorrhages of scurvy required another month (161 days) for their appearance. There was also a noticeable fragmentation of hair. Associated with these signs was a pronounced dryness of the skin, particularly over the extensor surfaces. These manifestations suggested vitamin A deficiency, but biophotometric tests showed normal visual adaptation in the dark, thus excluding this possibility. Subjective weakness was first noted at the end of the third month and increased progressively. A rather thorough study of the fatigue was made in the Fatigue Laboratory of Harvard University. Although it was due to some underlying physiologic deficiency, an explanation was not found. The subject suffered a steady and progressive weight loss of 27 pounds (12 Kg.). The blood pressure also fell. Anemia, however, did not occur, although the plasma protein fell slightly. Incidentally the subject, though previously susceptible to mild attacks of coryza, enjoyed complete freedom from respiratory infections, though the experimental period lasted through the winter months from October to May.

Wound healing was carefully studied by means of biopsies of previously inflicted wounds in the skin and fascia. The first observation was made three months after the start of the experiment; at this time normal wound healing occurred, although the plasma ascorbic acid level had been zero for forty-four days. The second test was made at the end of 182 days after the blood level of ascorbic acid had been zero for 141 days and forty days after the first clinical manifestation of scurvy. Definite failure of healing was noted at this time. Beneath the surface of the skin, which appeared well healed, was an unorganized blood clot. Microscopically the tissue showed a lack of intracellular substance and capillary formation. Parenteral vitamin C alone brought about good healing, and considerable intracellular substance appeared within ten days.

The disappearance of all signs and symptoms of scurvy was rapid following the intravenous injection

1. Crandon, J. H.; Lund, C. C., and Dill, D. B.: Experimental Human Scurvy, New England J. Med. **223**: 353 (Sept. 5) 1940.

of ascorbic acid. Saturation curves were determined each day for several days and proved most illuminating; after the first injection of 1 Gm. of the vitamin, i. e. when deficiency was complete, the plasma ascorbic acid level fell to almost zero in three hours. On the next day the same dose was injected but this time the level fell only to 0.25 mg. per hundred cubic centimeters in five hours. On the third day the same dose was injected but the level fell only to 0.75 mg. per hundred cubic centimeters even after seven hours following the injection. On the fourth day the level remained well above 1 mg. per hundred cubic centimeters, which is normal. In other words, the blood became completely saturated after 4 Gm. of the vitamin had been given intravenously, 1 Gm. on each of four successive days. Urinary excretion studies, however, indicated that the tissues were still not completely saturated at this time. These clearcut observations have obvious diagnostic as well as therapeutic implications. For example, the authors have calculated the approximate human requirement of the vitamin as lying between 30 and 45 mg. a day. This was determined by dividing the 4 to 6 Gm. needed to saturate the subject by 132 days, the period of total deprivation required to produce clinical scurvy.

Here then for the first time is a completely observed case of human scurvy under careful clinical, metabolic, chemical and dietetic control. The information should be widely studied; it enables the clinician to picture accurately the entire natural history of scurvy in one person. Analysis of the data will also resolve many disputed points which have resulted from uncontrolled observations. No doubt the experimental subject, when he returned to his regular diet, showed no deleterious effects of his experiences.

TWO PERIODICALS CELEBRATE ANNIVERSARIES

With its cover in a silver tone appears the first number of volume 26 of the *Journal of Laboratory and Clinical Medicine*. Its first editor was Dr. Victor C. Vaughan, and one member of its editorial board, Dr. Dennis E. Jackson, has served throughout the entire twenty-five years of its existence. The present editor is Dr. Warren T. Vaughan of Richmond, Va., a son of the first editor. In the twenty-five years that have passed since the first appearance of this publication, clinical pathology has developed a more distinguished status; indeed, for some the laboratory has achieved a position that is well nigh supreme in medical practice. However, the clinical aspects of medicine continue to be so vital that the maintenance of this periodical as a journal of both laboratory and clinical medicine is indicative of the manner in which the laboratory must continue to be the handmaiden of clinical practice. As Dr. Kilduffe says, however, in the concluding article of this issue, "Unless men of proper caliber can be induced to enter the field of clinical pathology . . . medicine in general will suffer, and hospitals . . . will be increasingly unable to fulfil the function and the destiny which are properly theirs."

The *American Journal of Obstetrics and Gynecology* celebrates now its twentieth anniversary. It continues to be the official organ of most of the important societies of specialists in the fields which it covers. Edited since its beginning by Drs. George W. Kosmak, its founder, and Hugo Ehrenfest, this publication has fulfilled its purpose adequately since its establishment. Indeed, a census of obstetricians and gynecologists made a few years ago as to whether there was need for any further publication to reflect advancement in this field yielded a response insufficient to stimulate the initiation of such a publication.

For many years the American Medical Association, through its House of Delegates, has urged that periodicals in the field of medical science confine their advertisements for pharmaceutic products, foods and physical apparatus to materials and preparations which have been passed on by the official councils of the Association. The primary purpose of these councils is to improve standards in the fields concerned, so that science rather than credulity controls medical prescribing for patients. Unfortunately, the obstetric journal which now celebrates its anniversary, and which has succeeded through the efforts of many distinguished physicians, has never limited its advertising to such standards. It has become apparently a medium for the promotion of products incapable of meeting these standards. Thus the current issue of the obstetric publication has some twenty-five of its advertising pages devoted to unacceptable products; these advertisements constitute more than half of all the advertising. Presumably the editors have little or no responsibility for or influence on the advertising standards.

Current Comment

MEDICINE ORGANIZES FOR THE EMERGENCY

Elsewhere in this issue appears a statement from the Committee on Information of the Division of Medical Sciences of the National Research Council describing the organization of various committees and subcommittees of that division to deal with medical problems associated with the military and naval services. These agencies were developed following a request from the United States Army and Navy Medical Corps for assistance in standardization of certain medical phases of their work. Gradually some form is beginning to develop in relationship to the organization of medical service in the emergency. Apparently the Health and Medical Committee in the Council of National Defense will have the responsibility for coordinating all the various agencies which have been established. To the Committee on Medical Preparedness of the American

Medical Association has been assigned advice in the development of such personnel as may be required. The Division of Medical Sciences of the National Research Council through its appropriate committees and subcommittees is charged with advice on standardization of medical procedures. There are innumerable agencies of the federal government which are concerned with certain aspects of medicine and the care of the public health. Apparently their coordination will rest to some extent on Miss Harriet Elliott, who is a member of the Advisory Commission on National Defense and who represents the consumer. She has appointed subcommittees which have been described in previous items in THE JOURNAL. These subcommittees are concerned with some of the health and medical problems of consumers throughout the United States. Medicine's representative on her committees is Dr. Thomas Parran of the United States Public Health Service. He is also a member of the Health and Medical Committee of the Council of National Defense. The representative of the American Medical Association and the Committee on Medical Preparedness on the Medical Committee of the Council of National Defense is Dr. Irvin Abell, and for the Division of Medical Sciences of the National Research Council it is Dr. Lewis H. Weed. These, with the Surgeon Generals of the government services, constitute the Health and Medical Committee. It should be possible with this arrangement of committees to meet any needs which may arise for personnel, for scientific medical advice or for dissemination of information to the people in the field of health and medical care. By proper cooperation between the various agencies that have been established, disorder and confusion should be avoided. THE JOURNAL hopes in a future issue to present a diagram illustrating the various bodies now established, their relationships to one another and the proper lines of communication for the effective handling of problems which may arise in the emergency.

NONPLUSING "VITAMINS PLUS"

For years THE JOURNAL, the Council on Pharmacy and Chemistry and the Council on Foods and Nutrition have protested the irrational and uneconomical administration of mixtures of vitamins. Some of these combinations include A, B, C, D, E, G and even K mixtures; for good measure some firms add minerals. Cultist practitioners, even though trained only in manipulative technics, prescribe great quantities of these pellets. The public has been deluged with appeals to use these unscientific mixtures for everything from acne and colds to heart disease and xerophthalmia. One of the most widely promoted mixtures is "Vitamins Plus." Its advertisements feature the silhouette of a damsel, somewhat scantily attired, in terpsichorean poise. Under date of October 23 the Federal Trade Commission released the following stipulation concerning this mixture:

Vitamins Plus, Incorporated, 370 Lexington Avenue, New York, has entered into a stipulation with the Federal Trade Commission in which it agrees to cease certain representations in the sale of a vitamin concentrate supplement designated "Vitamins Plus."

The respondent agrees to cease representing, directly or by implication, that cloudy or lusterless eyes or lack of whiteness of the teeth are generally due to Vitamin A deficiency; that vitamins are of significance in determining the duration of time hair stays in curl, or make-up remains on the skin surface, or nail polish adheres to the nails; that Vitamin B will maintain or nourish brain tissue, or will remove lactic acid from the blood stream and thereby eliminate fatigue, or is of value in cases of constipation or nervous disorders, except where and to the extent that such cases may be due to insufficient vitamin B; or that foods customarily consumed have but a negligible amount of Vitamin B.

Other representations which the respondent agrees to discontinue are that Vitamin E is known to be capable of preventing sterility or promoting mental or physical vigor; that by use of "Vitamins Plus" a person may expect to have sparkling eyes, or gleaming or lustrous hair, or a lovely complexion, or that one may become active, gay, beautiful or charming, or live without a "let-up" or "let-down."

Thus departs the glamour from Vitamins Plus; the bizarre claims will be no more; no doubt the thin girl may still waft herself across the page. The action of the Federal Trade Commission should be a salutary warning to the numerous imitators who have followed this trail toward entrancement of the gullible public. More than 200 vitamin products were pictured recently in an advertisement by a Chicago department store. Such promotion serves eventually to destroy well warranted public confidence in the real values of vitamins. Unscientific claims for hodge podge vitamin mixtures, supplemented with minerals as in Vitamins Plus, may well lead the public to the belief that vitamins are bunk.

PAN AMERICAN CONGRESS OF OPHTHALMOLOGY

The American Academy of Ophthalmology and Otolaryngology, in connection with its annual session in Cleveland in October, held the first Pan American Congress of Ophthalmology. For the Pan American Congress 219 physicians registered, of whom eighteen were Latin Americans from Central or South America. One Canadian was present. The remainder were ophthalmologists from the United States. The majority of the delegates from the Central and South American countries came from Cuba, Brazil and Puerto Rico. The congress will be administered by a council consisting of twenty-one representatives from each of the twenty-one American republics and it is planned that this congress will meet every three years. The likelihood is that the next meeting will be held in Montevideo, Uruguay. The president of the congress is Dr. Harry S. Gradle of Chicago. A special program was arranged for this congress, with alternate pages in English and Spanish, providing also abstracts of each of the papers presented. This would seem to be an excellent beginning toward the establishment of good scientific relationships between all the American nations. No doubt, as interest in such projects continues to grow the attendance from the South American countries may be expected to be much more representative.

MEDICAL PREPAREDNESS

In this section of The Journal each week will appear official notices by the Committee on Medical Preparedness of the American Medical Association, announcements by the Surgeon Generals of the Army, Navy and Public Health Service, and other governmental agencies dealing with medical preparedness, and such other information and announcements as will be useful to the medical profession.

THE NATIONAL RESEARCH COUNCIL AND MEDICAL PREPAREDNESS

Actively functioning in medical preparedness is the National Research Council with its Division of Medical Sciences. In these undertakings the Research Council and its parent body, the National Academy of Sciences, are fulfilling one of their primary obligations as quasigovernmental institutions. The National Academy of Sciences was established by President Lincoln in 1863, under a charter from Congress which provided that the Academy should, whenever called on, give advice to the government on "any subject of science or art." During the Civil War, committees of the Academy dealt with military and naval problems.

In 1916, when there was threat of involvement of this country in the World War, the Academy again offered its services for national defense. At that time, in order to provide effective organization, the Academy, at the request of President Wilson, created the National Research Council as its active agent in organizing the scientific resources of the country. During the war the National Research Council served as the Department of Science and Research of the Council of National Defense and also as the Science and Research Division of the U. S. Signal Corps. Even in the midst of these war enterprises it became evident that the Council might serve an important function in peacetime. Accordingly, on May 11, 1918, President Wilson issued an executive order requesting the National Academy of Sciences to perpetuate the National Research Council and outlining its duties. In addition to problems of defense it was to survey and stimulate research in the various sciences. The latter function has been its principal aim during the succeeding years.

The National Research Council itself is composed of nine major divisions, of which the Division of Medical Sciences is one. These divisions are arranged in two groups, one comprising the main branches of science and the other foreign relations and educational relations. Each division, then, has a governing body consisting of representatives from the leading national scientific societies in that field and also certain members at large. The National Research Council thus constitutes a democratic organization, acting for the great body of scientific men of the United States.

MEMBERSHIP OF DIVISION OF MEDICAL SCIENCES

The problems of medicine are dealt with almost entirely by the Division of Medical Sciences but there is close cooperation with the other branches of science. The following national societies are members of the division:

American Academy of Tropical Medicine
American Association of Anatomists
American Association of Pathologists and Bacteriologists
American Dental Association
American Medical Association
American Neurological Association
American Physiological Society
American Psychiatric Association
American Roentgen Ray Society
American Society of Biological Chemists
American Society for Clinical Investigation
American Society for Experimental Pathology
American Society for Pharmacology and Experimental Therapeutics
American Surgical Association
American Veterinary Medical Association
Association of American Physicians
Society of American Bacteriologists

CONTRIBUTION IN PRESENT EMERGENCY

At the annual meeting of the Division of Medical Sciences on April 26, 1940, the chairman, Dr. Lewis H. Weed, spoke of the problems of defense and offered the cooperation of the division to the representatives of the Army and Navy Medical Corps who were present at the meeting. About the middle of May, requests reached the chairman of the division from the Surgeon Generals of the Army and Navy asking that the division establish committees which should act in an advisory capacity to the two medical corps. As two problems were initially presented, (1) the use of chemotherapeutic agents in war casualties and mobilized forces and (2) the use of whole blood in individuals suffering from shock, two committees were initially named, on Chemotherapeutic and Other Agents and on Transfusions. These committees met a few days later and organized for the study of their specific problems. The details of their activities will be given later.

At these early meetings, so many problems relating to other branches of medicine and pertinent to military affairs were presented that it was quickly realized by the committee members and by the medical officers that it would be necessary to create additional committees covering the whole field of medicine. It was felt desirable that the general committees should function largely through subcommittees composed of the technical experts in their particular segments of medical knowledge. Overlap between the committees' interests was considered inevitable and probably advantageous; in consequence, several of the technical subcommittees were related to two of the main committees. General committees on Medicine and Surgery were appointed with subcommittees covering most of the special aspects of medical practice and research.

The membership of the committees and subcommittees represents the various groups and particularly the special societies devoted to these fields. The Surgeon Generals of the Army, Navy and Public Health Service have delegated representatives to attend the meetings of the committees in order to present problems and to give technical advice. In addition to the appointed members and the service representatives, special consultants have been called when problems in their field are presented.

Almost all of these committees have met a number of times and a great variety of problems has been discussed; many recommendations have been adopted. The representatives of the services present the problems on which they desire advice, and the whole question is carefully and broadly analyzed in open discussion. If the committee feels that recommendations can be made immediately, these are drawn up and forwarded to the interested services. In many cases, however, there is need for further study and such problems are then assigned to certain individuals of the committees, who later report back at the next meeting.

It is felt that the general function of these advisory committees of the National Research Council is to give professional advice to the services and to plan and administer research projects essential to the national defense. It happens that some committees by the nature of their interests have confined themselves almost entirely to professional advice while other committees are concerned largely with problems for which there is no immediate answer and which require investigation to supply the information needed.

STANDARDS OF PHYSICAL EXAMINATION

One example of the type of advice given to the Army is that relating to the regulation on "Standards of Physical Examination During Mobilization." The Army desired the latest knowl-

edge for this regulation and asked the Committee on Medicine for advice. The tentative manuscript was circulated among the members of the Committee on Medicine and then the sections on various specialties were brought up for discussion by the special groups, as for instance the Subcommittees on Tuberculosis, Cardiovascular Diseases, Diseases of Metabolism and Medical Nutrition. The recommendations thus presented were at once adopted by the War Department as far as they were practicable.

DEVELOPMENT OF PERSONNEL

In the last war it was found that there was great difficulty in assigning physicians to their proper place in the services, since sufficient information was not available as to their capabilities and experience. To obviate this difficulty the committees of the National Research Council are working in close cooperation with the Committee on Medical Preparedness of the American Medical Association in assembling all data on those medical men who will either volunteer or who will be called, so that each man will be placed most effectively.

EDUCATIONAL PROBLEMS

The exigencies and special problems of military organization require that the medical man brought into the service from civilian practice be given special training. This problem has been considered by a number of the committees. It is hoped that the medical schools and hospitals throughout the country will give this type of training in short courses to those doctors already brought into the services and also to those who expect to be called.

In order that the latest knowledge may be available to the medical officers, the Army Medical Corps requested that the subcommittees prepare manuals on their specialties. The Surgeon General's Office will soon issue a general manual which will cover the first aid treatment of war injuries, the treatment of medical emergencies and the chemotherapeutic treatment of infectious and venereal diseases. The sections for this have been prepared by the subcommittees. Many of the committees have been preparing material for larger technical manuals dealing with the operative procedure of war injuries and the like. Final arrangements for the publication of these have not yet been made.

COMMITTEES

Chemotherapeutic and Other Agents:

Perrin H. Long, Chairman	J. F. Mahoney
Francis G. Blake	E. K. Marshall Jr.
John S. Lockwood	

At its meeting on May 28, 1940, the committee divided its tasks under the following four subcommittees: Infectious Diseases, Venereal Diseases, Tropical Diseases and Surgical Infections.

The Subcommittee on Infectious Diseases:

Francis G. Blake, Chairman	Chester S. Keefer
Rolla E. Dyer	Stuart Mudd
Henry Helmholz	Thomas M. Rivers

This committee is studying problems of prevention and treatment and has already made certain recommendations. It has set up consultant groups for research on epidemics of influenza, pneumonia, encephalitis and poliomyelitis, meningococcic and hemolytic streptococcus infections, measles, and typhus, to be called when desired by the services.

The Subcommittee on Venereal Diseases:

J. Earle Moore, Chairman	Oscar F. Cox Jr.
Edwin P. Alyea	J. F. Mahoney
Charles W. Clarke	John H. Stokes

Eight meetings have been held. The committee has prepared memorandums on the prophylaxis and treatment of all the venereal diseases, utilizing the latest chemotherapeutic agents. It has made suggestions as to venereal disease control, for a standard nomenclature for the diagnosis of syphilis and, along with many of the other subcommittees, has outlined plans for the training of medical officers.

The Subcommittee on Tropical Diseases:

Wilbur A. Sawyer, Chairman	Thomas T. Mackie
Mark F. Boyd	Henry E. Meleney
Edward H. Hume	Robert B. Watson

Recommendations on the prevention and treatment of these diseases have been prepared. Arrangements have been made for the manufacture of yellow fever vaccine, at present by the Rockefeller Foundation and eventually by the government. The committee is studying the problem of malaria prophylaxis.

The Subcommittee on Surgical Infections:

Frank L. Meleney, Chairman	Perrin H. Long
John S. Lockwood	Champ Lyons

As its chief function at present the committee is organizing a research project on the prevention of wound infection and the treatment of burns. It is planned to study the efficacy of the sulfonamide compounds in civilian accident injuries and thus to arrive at a more rational treatment of war injuries to supplement the present technic of débridement.

The main Committee on Chemotherapeutic and Other Agents assembles the recommendations of its subcommittees and reviews the technical aspects. It also has prepared a list of trained experts in chemotherapy.

The Committee on Transfusions:

Walter B. Cannon, Chairman	E. D. Plass
Alfred Blalock	Max M. Strumia
	Cyrus C. Sturgis

On May 31, 1940, this committee held its first meeting. After prolonged discussion of the general problem as presented by the officers of the Army and Navy Medical Corps it decided to organize two Subcommittees on Blood Substitutes and on Shock.

The Subcommittee on Blood Substitutes:

Cyrus C. Sturgis, Chairman	O. H. Robertson
Elmer L. DeGowin	John Scudder
E. D. Plass	Max M. Strumia
	Owen H. Wangensteen

This group is primarily concerned with the study of the relative merits of whole blood, serum, and of wet and dry plasma in transfusion. Methods of preparation, transportation and administration are being considered and projects covering all of these aspects have been set up.

The Subcommittee on Shock:

Alfred Blalock, Chairman	Paul D. Lamson
Philip Bard	Frank C. Mann
Henry K. U. Beecher	D. B. Phemister
Norman E. Freeman	

Here fundamental investigation was thought essential. Some twenty-five projects dealing with all aspects of this subject have been proposed and a number of these are already under way. The committee has assembled material for a manual.

The Committee on Medicine:

Russell M. Wilder, Chairman	Warfield T. Longcope
Arthur L. Bloomfield	Hugh Morgan
James D. Bruce	W. W. Palmer
Roger I. Lee	James E. Paullin
	O. H. P. Pepper

This committee has the following Subcommittees:

Cardiovascular Diseases:

Paul D. White, Chairman	Ashton Graybiel
Edgar vanNuys Allen	Robert L. Levy
E. Cowles Andrus	William D. Stroud

Tuberculosis:

Esmond R. Long, Chairman	Herbert R. Edwards
James B. Amberson Jr.	Paul P. McCain
Bruce H. Douglas	James J. Waring

Metabolism:

J. H. Means, Chairman	John H. Talbott
Louis H. Newburgh	George W. Thorn
Elmer L. Sevringhaus	

Medical Nutrition:

Russell M. Wilder, Chairman	J. S. McLester
Paul E. Howe	Tom Spies
Norman Jolliffe	V. P. Sydenstricker
	Dwight Wilbur

Clinical Investigation:

David P. Barr, Chairman
(Eugene F. Du Bois was chairman until October, when he became chairman of the Committee on Aviation Medicine)

Detley W. Bronk	A. C. Ivy
David B. Dill	Irvine H. Page
George A. Harrop	Maurice C. Visscher

Therapeutics:

O. H. P. Pepper, Chairman	Maurice C. Pincoffs
Hugh Morgan	William B. Porter

In addition, the Subcommittees on Infectious Diseases, Tropical Diseases and Venereal Diseases, whose members have been given, are also related to the Committee on Medicine.

Besides reviewing the work of its subcommittees, the main Committee on Medicine has been making a survey of laboratory procedures for military hospitals and has given advice on the Mobilization Regulations. The latter has been the principal work to date of the Subcommittees on Cardiovascular Diseases, Tuberculosis and Metabolism, although they have frequently consulted with other committees on common problems.

The Subcommittee on Medical Nutrition has been dealing with the general phases of the subject, particularly as they relate to Army and Navy rations. Certain questions have been presented by the Quartermaster Corps of the Army and the Supply Corps of the Navy concerning the sufficiency of vitamins in rations, and already a number of the subcommittee's recommendations have been adopted. The nutritional needs of the whole population have been discussed and recommendations made for the restoration of vitamins to flour.

The Subcommittee on Clinical Investigation has served as a clearing house for problems requiring physiologic and medical research, routing some to appropriate committees and assigning those of a more general nature to various laboratories under the sponsorship of committee members. So far, some forty problems have been submitted. Reports on these have been made and arrangements outlined for carrying out the investigations. Among the subjects under consideration are fatigue, pressure studies, night blindness and dark adaptation, clothing for high and low temperatures, and gas poisoning.

The Subcommittee on Therapeutics has prepared a section on medical emergencies for the general manual and is making a survey of the drugs in the Army and Navy chests.

The Committee on Surgery:

Evarts A. Graham, Chairman	Robert H. Ivy
Irvin Abell	Herman L. Kretschmer
Donald C. Balfour	Charles G. Mixter
George E. Bennett	Howard G. Naffziger
Warren H. Cole	Alton Ochsner
Frederick A. Coller	I. S. Ravdin

has, as subcommittees:

Subcommittee on Anesthesia:

Ralph M. Waters, Chairman	John S. Lundy
	Emery A. Rovenstine
Lewis S. Booth	Ralph M. Tovell

Subcommittee on Radiology:

A. C. Christie, Chairman	Byrl R. Kirklin
William E. Chamberlain	Ursus V. Portmann

Subcommittee on Wound Healing:
Allen O. Whipple, Chairman

The surgical specialties are organized under a coordinating committee composed of the chairmen of the respective committees under the general chairmanship of Frederick A. Coller. This committee correlates the activities of the other groups and one of its chief tasks is the evaluation of specialist personnel. At present the subcommittees are concerned largely with problems of training and with the preparation of material for manuals.

The subcommittees on the surgical specialties are:

Subcommittee on Neurosurgery:

* Howard G. Naffziger, Chairman	Howard W. Fleming
Alfred W. Adson	* Gilbert Horrax
Charles Bagley Jr.	* Max M. Peet
* Percival Bailey	Cobb Pilcher
Claude C. Coleman	* Tracy J. Putnam
Loyal Davis	Byron P. Stookey

Subcommittee on Faciomaxillary and Plastic Surgery:

Robert H. Ivy, Chairman	P. C. Lowery
John S. Davis	Ferris Smith
Joseph D. Eby	

Subcommittee on Otolaryngology:

Harris P. Mosher, Chairman	V. H. Kazanjian
	Samuel J. Kopetzky
George M. Coates	Harold I. Lillie
Ralph A. Fenton	John J. Shea
William E. Grove	Burt R. Shurley
Frederick T. Hill	William P. Wherry
Charles J. Imperatori	

Subcommittee on Vascular Injuries:

John Homans, Chairman	Daniel C. Elkin
Arthur W. Allen	Walter G. Maddock
Geza de Takats	

Subcommittee on Thoracic Surgery:

Evarts A. Graham, Chairman	Edward D. Churchill
	Leo Eloesser
Isaac A. Bigger	

Subcommittee on Orthopedic Surgery:

George E. Bennett, Chairman	J. Albert Key
	Frederick C. Kidner
LeRoy C. Abbott	Guy Leadbetter
Harold Conn	Paul B. Magnuson
William Darrach	M. N. Smith-Petersen
Robert H. Kennedy	Philip D. Wilson

Subcommittee on Physical Therapy:

John S. Coulter, Chairman	Frank M. Krusen
Frank H. Ewerhardt	Walter J. Zeiter
Kristian G. Hansson	

Subcommittee on Urology:

Herman L. Kretschmer, Chairman	Frank Hinman
	Oswald S. Lowsley
William Braasch	Albert J. Scholl
Homer G. Hamer	

Subcommittee on Ophthalmology:

Harry S. Gradle, Chairman	Peter C. Kronfeld
William L. Benedict	Lawrence T. Post
Sanford R. Gifford	

The Subcommittees on Shock and on Surgical Infections also are related to the general Committee on Surgery.

Committee on Information:

Morris Fishbein, Chairman	Ira V. Hiscock
J. J. Bloomfield	Sanford V. Larkey
John F. Fulton	Robert N. Nye
Richard M. Hewitt	

To this committee was delegated the assembling and dissemination of information concerning war medicine and the work of the committees and of other organizations. The committee will give general advice on the editing of manuals, bulletins and other publications. Its Subcommittee on Publicity:

Morris Fishbein, Chairman	William L. Laurence
Watson Davis	Arthur T. Robb
David Dietz	

will prepare press releases.

* Acting committee, and chairmen of special committees.

The Subcommittee on Historical Records:

John F. Fulton, Chairman	George Stewart
E. H. Cushing	Henry R. Viets
Archibald MacLeish	

This group will assemble all the documentary materials relating to this emergency and eventually it will aid in compiling its history. Another subcommittee, that on Correlation of Information, Sanford V. Larkey, Chairman, attends to the distribution of the various communications from the committees, indexes the minutes and other publications and in general acts as liaison between all of the committees. In order to facilitate its work, the subcommittee has established an office in Washington in the National Academy-Research Council building.

Committee on Aviation Medicine:

Eugene F. Du Bois, Chairman	John F. Fulton
	Eugene M. Landis
Cecil K. Drinker	Walter R. Miles

This group has been organized at the request of the Health and Medical Committee of the Council of National Defense. This committee will take over the problems on aviation medicine, some of which had already been considered by other subcommittees.

One other general committee is in process of organization, that on Neuropsychiatry:

Winfred Overholser, Chairman	Adolf Meyer
	Tracy J. Putnam
Franklin Ebaugh	Harry Steckel
Foster Kennedy	John C. Whitehorn

This committee was also formed at the request of the Health and Medical Committee.

The chairmen of the seven main committees constitute an executive committee, under the chairmanship of Dr. Lewis H. Weed, representing the Division of Medical Sciences. Its province is largely confined to policy and budgetary matters and except in rare instances, it will not pass on scientific or technical recommendations.

On Sept. 19, 1940, the Council of National Defense established the Health and Medical Committee. "It will be the responsibility of the Committee to advise the Council of National Defense regarding the health and medical aspects of National Defense and to coordinate health and medical activities affecting National Defense." The National Research Council, as a quasi-governmental agency, is represented on this committee, through the chairman of the Division of Medical Sciences, Dr. Lewis H. Weed; and the work of its committees and subcommittees are, therefore, integrated into the whole endeavor. To the committees of the National Research Council will fall the problems of special professional advice and research, while other more general aspects will be dealt with by committees set up directly under the Health and Medical Committee.

WAR DEPARTMENT NEEDS MEDICAL TECHNICIANS

Medical technicians experienced in surgical and x-ray work are needed by the War Department. The United States Civil Service Commission has announced an examination to fill these positions in the following grades and optional subjects: senior medical technician (roentgenology) $2,000 a year, medical technician (roentgenology and surgical) $1,800 a year, assistant medical technician (roentgenology and surgical) $1,620 a year. The salaries are subject to a retirement deduction of 3.5 per cent.

Applications must be on file with the commission's Washington office not later than November 28 if received from states east of Colorado and not later than December 1 if received from Colorado and states westward.

Applicants must have completed a four-year high school course unless they pass a written general test and, in addition, they must have had responsible experience in surgical duties in an operating room or clinic, or in x-ray work including x-ray photography and posturing, and in the installation and maintenance of x-ray apparatus. Appropriate college study may be substituted for part of the required experience. With the exception of those who have not completed the high school course, applicants will not be given a written test. All competitors will be rated on their qualifications as shown in their applications and on corroborative evidence.

Information regarding the examinations and the application forms may be obtained from the Secretary of the U. S. Civil Service Examiners at any first or second class post office or from the United States Civil Service Commission, Washington, D. C.

MILITARY HOSPITAL AT LOUISIANA STATE UNIVERSITY

A military general hospital will be organized at Louisiana State University Medical Center in compliance with a request from the Office of the Surgeon General, U. S. Army, Washington, D. C., under the direction of Dr. Urban Maes, professor of surgery at the school. These units are organized by the war department in peace time as regular army inactive units required for mobilization in the event of a national emergency. The object is to provide through affiliation with selected civil institutions integrated hospital units with qualified, coordinated personnel prepared for early active military duty as may be required.

MILITARY APPOINTMENT AT UNIVERSITY

Major Ira F. Peak, U. S. Army, retired, former clinical director of Pinebluff Sanitarium, Pinebluff, N. C., has been assigned as instructor of military science and tactics at Indiana University School of Medicine, Indianapolis. He succeeds Col. Wilson C. Von Kessler, who was transferred to San Francisco as commanding officer of the medical regiment at Camp Ord.

DR. KOPETZKY HEADS DRAFT BOARD PHYSICIANS IN NEW YORK

Dr. Samuel J. Kopetzky has been appointed chief medical officer of the draft boards of New York City, it was announced October 19. Physicians to serve the 280 draft boards in the city were announced at the same time. Names of these physicians were taken from a list recommended by Dr. Kopetzky, as were members of advisory boards that will serve every twenty or so local boards to check the conclusions of the medical officers in cases in which a specialist's advice is needed.

SOUTH CAROLINA PREPAREDNESS COMMITTEES MEET

A conference of state and county committees on medical preparedness of the South Carolina Medical Association was held in Columbia, October 14. Dr. Edgar A. Hines, Seneca, state chairman, reported the conference on medical preparedness held at the headquarters of the American Medical Association, September 20, and Dr. Edgar Hill Greene, Atlanta, state chairman for Georgia, made an address on medical preparedness.

ORGANIZATION SECTION

CALIFORNIA PHYSICIANS' SERVICE

The organization of California Physicians' Service is the outgrowth of several years of study, experiment, attempted legislation and a multitude of proposed plans. The preliminary work included a much discussed study of medical conditions in California for which the California Medical Association expended about $50,000. It also includes a great amount of public controversy before legislative committees, in nearly all California periodicals and in the 1939 California legislature of a plan, which received the energetic support of the current administration, for compulsory sickness insurance. There have been more private prepayment plans and so-called insurance schemes in California than in most other states, some of which were shown to be gross frauds on the public and which subjected their originators and managers to criminal prosecution and conviction. For several years the sessions of the House of Delegates of the California Medical Association have devoted much of their time to discussions of proposals for plans for the prepayment of medical service. The present plan would seem to have been preceded by ample investigation and consideration.

The plan as finally adopted was in the form of a nonprofit corporation based on three classes of members: administrative, professional and beneficiary. There are seventy-five administrative members, the majority of whom are members of the California Medical Association but include a number of nonmedical members who have been elected by not less than two thirds of the administrative members who represent districts. The administrative members elect the board of trustees of the plan and are responsible for most of the administrative features of the plan.

PROFESSIONAL MEMBERSHIP

Professional members include any person licensed to practice medicine under the laws of the state of California who carries malpractice insurance and who signs an application blank agreeing to serve under the rules and by-laws and pays a $5 registration fee. According to the latest reports 5,200 California physicians have enrolled under the plan. The 1940 American Medical Directory lists 11,909 licensed physicians in the state, of whom about 9,000 are in active private practice. The money obtained from registration fees constitutes a part of the working capital of the service. The California Medical Association lent the service $15,000 when it started to meet initial organization expenses and later made additional loans totaling $27,000.

The service was incorporated on Jan. 2, 1939, and began actual operation about July 1, 1939. The administrative members elected a board of nine trustees, including eight physicians and one layman, who receive no salary. The board of trustees elected a medical director, who must be a physician not engaged in private practice. The state is divided into twenty-one districts, each having an assistant medical director operating under the supervision of the general medical director. These medical directors are not to supervise medical care but only to safeguard the use of money from the fund in order that it may furnish adequate service to beneficiary members. Certain medical procedures and operations require the approval of the assistant medical director before they can be undertaken. Each professional member is required to carry malpractice insurance, and clauses in the contracts with the beneficiary members who are to receive the service exempt California Physicians' Service from any legal liability in connection with the professional services rendered.

BENEFICIARY MEMBERSHIP

The beneficiary members are the prospective patients. These must be under 65 years of age and belong to families with incomes of not more than $3,000 annually. There has been considerable discussion as to the income limit, and persons with more than $3,000 annual income are admitted with a provision that the physician will be permitted to make a special charge for services in addition to that provided for in the fee schedule. In order to insure a fair selection, the plan provides that members will be accepted for service only in groups of five or more, such groups being already in existence, generally as employees of a single industry. In small groups, eleven and under, 100 per cent participation is required, and in larger groups at least 50 per cent must enroll. Proposals are also under consideration to arrange for the inclusion of individual members at a rate somewhat above that charged for those in groups. At present the established rate is $2.50 a month per person for full coverage, as described later, and $2 a month when a member agrees to pay for the first two visits in any illness. Of these payments, 80 cents a month is set aside to pay for hospital insurance, which is carried by an independent but, to some extent, affiliated nonprofit hospital association.

Medical services include home and hospital calls and surgical services. Obstetric service is furnished after two years' continuous membership but does not include hospital care. All kinds of laboratory examinations, including x-ray and radium therapy and anesthetics, are provided. Unlimited specialist care is furnished usually after the endorsement of the medical director without regard to the amount. Drugs and appliances are not included. Illness arising from insanity, mental disease, alcoholism, drug addiction, self-inflicted injuries, dental services and injuries covered by workmen's compensation or other insurance are also excluded. The beneficiary member has complete freedom of choice among all physicians who have become professional members. All professional members vote on equal terms on all matters subject to vote, whether members of the California Medical Association or not.

Payments to the physicians are made on the "unit system." This means that a fee schedule exists in which the charges are not expressed in monetary units but in units of service, the cash value of which depends on the total income received. A single unit is an ordinary "repeat" office call, and all other items are multiples of this. For example, a fracture of the clavicle with four weeks' care is thirty units. The amputation of a finger or a toe is six units. A similar unit scale applies to payments for laboratory and x-ray service. It was

recognized by the administrative members of California Physicians' Service at the annual meeting that:[1]

> There are a great many procedures which are so variable in extent that no unit value has been placed upon them here. Whenever such procedures are performed, the units to be charged for them may be agreed upon by consultation with the Medical Director, pending the time that accumulated experience can include them in the formal schedule.

The unit system of payment is a recognition of the fact that in every system of prepaid medical service there are certain incalculable elements, and if the plan is to avoid bankruptcy provision for this condition must be made by the insertion of some flexible element which can be varied to balance income. In compulsory sickness insurance and nearly every system of contract practice this flexible element is the quality of the medical service. It is often pointed out that compulsory sickness insurance systems never become bankrupt. Close students of these systems know that this is because the quality and quantity of the medical service are varied to fit the available income. It is possible to lower the quality or reduce the quantity of medical service in such systems without the knowledge of the patients, who are incapable of judging the character of the medical service received. In the California plan the unit system makes the income of physicians the flexible element and thereby insures that the quality and quantity of the service will not be subject to financial limitations unknown to the patient. The physician's bill presented to the service describes the separate services given and these are then calculated according to the fee schedule expressed in units. The income for any period (it is computed monthly at present) is then divided by the total number of units supplied to all patients during that period, and the result is the value of the unit in cash according to which the physician is paid.

California Physicians' Service

Month	Beneficiary Membership	No. of Patients Served	No. of Doctors Serving Patients	Collections from Beneficiary Members (from Which Professional Bills Are Paid)	Unit Value
Aug. & Sept. '39	1,220	.....	.....	$2,823.83	$1.75
Oct. '39	2,270	.....	.....	3,721.98	1.60
Nov. '39	3,700	.....	.....	6,068.15	1.60
Dec. '39	5,742	.....	.....	9,416.86	1.60
Jan. '40	7,000	.....	.....	11,496.60	1.50
Feb. '40	8,437	.....	.....	13,311.00	1.30
Mar. '40	9,322	1,488	868	15,910.44	1.30
Apr. '40	10,868	1,685	1,053	18,137.49	1.25
May '40	11,949	1,964	1,057	20,110.80	1.25
June '40	14,065	1,993	1,109	23,207.10	1.35
July '40	15,608	2,219	1,199	25,868.85	1.35
Aug. '40	16,650	.....	.....	27,409.45	1.35
Sept. '40	17,398	.....	.....	.....	....

The accompanying table shows growth of membership by months and, for a five months period from March to July 1940, the number of patients served, the number of doctors serving patients, revenue and the unit value.

The growth of beneficiary membership has proceeded steadily at a rate between 1,000 and 1,500 additional members a month from the time of organization. The membership on October 15 was 18,224. Several additional fields of activity are being explored. Officials of several schools have already approached California Physicians' Service with the suggestion that the service take over the medical care of their student bodies. Owing to the fact that the incomes of many of the families of students in educational institutions exceed $3,000 annually, it is necessary to make special arrangements. The house of delegates has granted permission to make such contracts with schools subject to the approval of the county medical societies in which the schools are located. Negotiations are under way with relief authorities for arrangements for medical care of persons receiving public assistance.

1. California Physicians' Service, California & West. Med. **51**: 337 (Nov.) 1939.

MEDICAL EXPENSE FUND OF NEW YORK, INC.

The Medical Expense Fund of New York, Inc., 122 Seventy-Sixth Street, Brooklyn, was organized by physicians in the following counties of New York: Bronx, Columbia, Delaware, Dutchess, Greene, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster and Westchester. The plan was incorporated in October 1939 according to the provisions of the Piper Hampton bill, article IX-C of the insurance laws, as a nonprofit medical expense indemnity corporation for the purpose of furnishing medical expense indemnity to persons who become subscribers to the plan.

The Medical Expense Fund of New York, Inc., has received a permit to operate under the supervision of the State Department of Insurance and the plan has been approved by the State Department of Social Welfare. It is directed by a board of trustees consisting of twenty-four members, at least eight of whom shall be other than physicians. The members of the board of trustees were chosen to represent the various counties included in this plan. The trustees are elected by and are responsible to the administrative members of the plan. A general advisory board consisting of representatives of the Associated Hospital Service of New York, the Hospital Superintendents' Association and other health agencies and the public at large was appointed by the board of trustees.

The management of the plan is directed by an administrative board consisting of five members appointed by the board of trustees. Any physician licensed in the state of New York is eligible for professional membership in the plan, and a registration fee of $5 is required of each member. Officers and trustees of the plan and those physicians who are residents in a county in which the Medical Expense Fund of New York, Inc., operates, and who are also members of the house of delegates of the Medical Society of the State of New York, are eligible for administrative membership with voting privilege.

Beneficiary Membership Eligibility Table—Premium Rates and Deductible Sums

Contract Series	Monthly Income: With Dependents	Monthly Income: Without Dependents	Annual Premium When Enrolled Individually	Annual Premium When Enrolled by Groups	Maximum Indemnity in a Contract Year	Deductible Sums
A	Over $175	Over $125	$17	$15.00	$500	$10.00
B	$175 to 140	$125 to 100	15	12.60	500	10.00
C	$140 to 100	$100 to 75	12	10.80	500	7.50
D	Under $100	Under $75	10	9.00	500	5.00

Beneficiary members include all persons who subscribe for medical expense indemnity benefits under the terms and conditions of the plan. Beneficiary members or subscribers have free choice of physicians from among the participating physicians in the plan.

In case of an emergency or when it is reasonably necessary for the subscriber to obtain medical services from a physician who is not a member of the plan, the subscriber will receive indemnities for medical expenses incurred according to the provision of the contract. The subscriber's contract also provides indemnities for payment of services of a specialist if the subscriber was referred to the specialist by the attending physician. If the subscriber chooses a specialist without first consulting his own physician, the plan will pay indemnities at the rate provided for general medical services and the subscriber must arrange to pay any additional sum himself.

The plan provides four types of subscribers' contracts, as shown in the accompanying table.

Rates for dependents are the same as for subscribers. Dependents are spouse and unmarried children under 18 years of age.

Persons may be enrolled in groups or individually. When enrolled by groups, at least 75 per cent of the group must apply but no medical examination is required. Individual applicants must present a statement from their family physician that they are not in need of immediate medical care. Persons over 65 are not eligible for membership, nor persons whose family physician is not a professional member of the plan.

Beneficiary members are entitled to receive general medical care including home, office and hospital visits, up to $300 indemnity in any one year, a maximum of $300 indemnity for surgical service in a contract year, and up to $100 in a contract year for services received from a specialist at the request of the attending physician. The contract also provides that a member may receive up to $50 in indemnities for services from a pathologist, $100 for diagnostic services of a radiologist and $300 for radium or x-ray therapy from a radiologist, and $75 for the services of an anesthesiologist. The total amount of indemnities a beneficiary member may receive in any contract year is $500. All indemnities are payable directly to the physician who rendered the services, according to a schedule of fees established for the plan.

EXCLUSIONS

Indemnity will not be paid for services for preexisting illnesses or injuries, and there is a ten day waiting period before the contract becomes effective for illnesses, but no waiting period for injuries. Obstetric services are covered only after a ten month waiting period.

Mental disorders and illnesses or injuries due to alcoholic or drug addiction are excluded, or any occupational injuries or illness covered by workmen's compensation laws.

On Sept. 7, 1940, 1,524 physicians residing in those counties in which the plan is to operate had applied for professional membership in the plan. Additional applications are being received daily. The officers contemplated offering the plan to the public some time in October.

OFFICIAL NOTES

ANNUAL CONFERENCE ON MEDICAL EDUCATION AND LICENSURE

In the light of present conditions, more than usual importance attaches to the Congress on Medical Education and Licensure to be held in Chicago Feb. 17 and 18, 1941. The relationship of the medical profession to national preparedness will be discussed by Dr. Lewis H. Weed, chairman of the Medical Section of the National Research Council and a member of the President's committee to coordinate medical activities. The entire program will be published in THE JOURNAL early in December.

DOCTORS AT WORK

Doctors at Work is the title of the sixth annual series of dramatized radio programs to be presented by the American Medical Association and the National Broadcasting Company.

The series will open Wednesday, November 13, and run for thirty consecutive weeks, closing with a broadcast from the A. M. A. meeting at Cleveland on June 3, 1941. The program is scheduled for 10:30 p. m. eastern standard time (9:30 central, 8:30 mountain, 7:30 Pacific time) over the Blue network, other N. B. C. stations and Canadian stations.

The programs will dramatize what modern medicine offers the individual in the way of opportunities for better health and the more successful treatment of disease. Incidental to this main theme the programs will explain the characteristics of the different fields of modern medicine and its specialties.

Doctors at Work will be broadcast from scripts by William J. Murphy, N. B. C. script writer and author of many previous A. M. A.-N. B. C. "shows" and other popular radio features. It will be produced under the direction of J. Clinton Stanley, director of Medicine in the News, last season's successful A. M. A.-N. B. C. health program. Supervision will be by the A. M. A. Bureau of Health Education, directed by Dr. W. W. Bauer.

Descriptive posters for local distribution may be had gratis from the Bureau of Health Education, American Medical Association, 535 North Dearborn Street, Chicago. Program titles will be announced weekly in THE JOURNAL and monthly in *Hygeia*, the Health Magazine.

The titles of the first three programs are as follows:

November 13, "Want to Be a Doctor?"
November 20, "The Years in Training."
November 27, "Through Hospital Corridors."

WOMAN'S AUXILIARY

Pennsylvania

The annual meeting of the woman's auxiliary to the tenth councilor district of the Medical Society of the State of Pennsylvania was held at Pittsburgh, July 17, with Mrs. Howard A. Power, district councilor, presiding. Dr. Charles H. Henninger, Pittsburgh, president of the Medical Society of the State of Pennsylvania, spoke on "Relations of Councilor District to the State Medical Society." An address was delivered by Mrs. Maxwell Lick, Erie, president-elect of the woman's auxiliary to the Medical Society of the State of Pennsylvania. The latest project for the care of convalescent cardiac children in Allegheny County, "Heart House," was described by Miss Martha Leslie, Pittsburgh, executive secretary of the child health division of the General Health Council of Allegheny County.

More than 100 members and guests attended the final meeting of Berks County auxiliary in June. Mrs. LeRoy W. Frederick, retiring president, read a report of the year's activities. The membership is now 131. A contribution of $200 was made to the Medical Benevolence Fund.

The Chester County auxiliary reported $100 contributed to the Medical Benevolence Fund at their meeting in June. A silver pin was presented by the auxiliary to the retiring president, Mrs. Michael Margolies, in recognition of her services. Mrs. Howard W. Hassell presided and gave her report for the year. During her term many new members were received, $275 was turned over to the Medical Benevolence Fund of the state society, and the sewing group made and contributed more than fifty children's garments to hospitals and the Children's Aid Society.

The concluding meeting of the Schuylkill County auxiliary was held in June at Pottsville when officers for the new year were elected and plans made for the Medical Benevolence Fund project. One hundred and eighty dollars, which was derived from a public card party and from private parties, was contributed to the fund.

The York County auxiliary voted $150 to the Medical Benevolence Fund at their meeting in June. Their membership totals sixty-seven, which includes eleven new members.

Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST: SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION AND PUBLIC HEALTH.)

DISTRICT OF COLUMBIA

Society News.—The Baltimore City Medical Society and the District of Columbia Medical Society will hold a joint meeting in Washington, November 13; the speakers will be Drs. Allen F. Voshell, "Progressive Muscular Dystrophy: Its Present Status"; Harris B. Shumacker Jr., "Reactions to Local Anesthetic Agents," and James G. Arnold Jr., "Cauda Equina Tumor with Unusual Symptomatology." All are of Baltimore.

Postgraduate Institute for Negro Physicians.—Howard University conducted a postgraduate institute for Negro physicians, November 3-6, in cooperation with the Tuberculosis Association of the District of Columbia, the Maryland Tuberculosis Association, the Medico-Chirurgical Society and the Social Hygiene Society of the District of Columbia. Tuberculosis, syphilis and maternal and child health were discussed and sessions were open to physicians from the District, Maryland and Virginia. The institute was preceded by a meeting for the public. The speakers included Drs. Clarence Leon Wilson, Chicago, obstetrics; William Roderick Brown Jr., Pittsburgh, tuberculosis; Theodore K. Lawless, Chicago, syphilis, and Edward W. Beasley, Chicago, pediatrics.

GEORGIA

Campaign Against Appendicitis.—The Medical Association of Georgia in cooperation with the druggists of the state recently launched a campaign against appendicitis. Physicians plan to address every high school class in the state as well as parent-teacher groups, woman's clubs and other civic bodies on the meaning of abdominal pain, and the druggists will cooperate by affixing warning stickers to every laxative and cathartic they sell without a prescription. Dr. Thomas C. Davison, Atlanta, is in charge of the association's committee directing the campaign. Subcommittees have been named for each congressional district of the state.

Personal.—Dr. Charles W. Harwell, assistant professor of anatomy, Emory University School of Medicine, Atlanta, has resigned to become a fellow in public health at the University of North Carolina.——Dr. John D. Stillwell, McRae, has been named director of the southeastern region of the state department of public health, which covers twenty-six counties. He will have headquarters in Waycross, succeeding Dr. Bert H. Malone, resigned.——Dr. Charles D. Bowdoin, Atlanta, director of the division of preventable diseases, state department of public health, has been appointed special consultant for the U. S. Public Health Service by Dr. Thomas Parran, surgeon general of the service.

ILLINOIS

Association for the Crippled.—The Illinois Association for the Crippled met at the Hotel LaSalle, Chicago, November 7-8. Subjects to be discussed were "What Is the Role of Our Physically Handicapped Youth in America Today?" "The School of Another Chance" (motion picture) and "The Need for a Program for Spastics in Illinois."

Memorial to Dr. Lockhart.—A bronze tablet was unveiled at the Witt School, September 22, to honor the memory of the late Dr. Charles H. Lockhart, Witt. It was the gift of the teachers and citizens of Witt. Dr. Lockhart had been a member of and president of the Witt Board of Education for twenty-one years. The inscription on the tablet characterizes Dr. Lockhart as "a moral and civic leader and a community leader." The late Dr. Lockhart had also served as mayor of Witt.

Chicago

The Belfield Lecture. — Dr. John Scudder, New York, delivered the twelfth William T. Belfield Memorial Lecture, October 17, before the Chicago Urological Society, on "Some Aspects of Surgical Shock."

Branch Meetings. — Dr. Walter P. Blount, Milwaukee, addressed the South Chicago Branch of the Chicago Medical Society, October 22, on "Fractures in Children Are Different."——Dr. Hugo O. Deuss discussed "Newer Aspects of Tuberculosis" before the Southern Cook County Branch, October 22.——The Aux Plaines Branch was addressed, October 25, by Dr. Ralph M. Waters, Madison, Wis., on "Anesthesia."——Dr. Edward William Alton Ochsner, New Orleans, addressed the Calumet Branch, October 25, on "Thrombophlebitis—A Physiologic Consideration of Therapy."——The North Shore Branch was addressed, November 5, by Drs. Chevalier L. Jackson, Philadelphia, and Thomas E. Carmody, Denver, on "Tumors of the Bronchi and Lungs" and "Infections of Face and Mouth" respectively.

MARYLAND

Personal. — Dr. Edward Ross Davies, Ellicott City, formerly health officer of Howard County, has been appointed assistant commissioner of health of Baltimore, effective September 18, to succeed Dr. William H. F. Warthen, who is now health officer of Baltimore County.

Joint Psychiatric Meeting. — The Maryland Psychiatric Society and the neuropsychiatric section of the Baltimore City Medical Society will hold a joint dinner meeting at the Johns Hopkins Faculty Club, Baltimore, November 14. The speakers will be Chandler M. Brooks, Ph.D., on "Relation of the Central Nervous System to Certain Sexual and Reproductive Functions," and Dr. Manfred S. Guttmacher, "Medicolegal Aspects of Mental Disorders."

MASSACHUSETTS

Society News.—Dr. Paul Dufault, Rutland, discussed "The Danger of Infection from Tuberculosis to Hospital Personnel" before the Worcester District Medical Society at the Rutland State Sanatorium, October 9, and Dr. August R. Crane, Rutland, "Pyelonephritis."——The Four County Medical Society, comprising the district societies of Berkshire, Franklin, Hampden and Hampshire, was addressed in Springfield, October 9, by Drs. Soma Weiss, Edward D. Churchill, Foster S. Kellogg and Burton E. Hamilton. They presented a symposium on "Dyspnea and Edema: Their Significance in Diagnosis and Prognosis." All are from Boston.——Dr. Charles H. Robson, Toronto, discussed "Anesthesia for Children" before the New England Society of Anesthesiology, October 7.

Dr. John Gordon Named Charles Wilder Professor of Preventive Medicine at Harvard. — Dr. John E. Gordon, professor of preventive medicine and epidemiology, Harvard Medical School, Boston, and director of the new Harvard Public Health Unit and Harvard-Red Cross Hospital in England, has been promoted to Charles Wilder professor of preventive medicine and epidemiology. This professorship is not restricted to men in one field of medicine. It was last held by the late Dr. Hans Zinsser, who was Charles Wilder professor of bacteriology and immunology. Dr. Gordon recently returned from England, where he made arrangements for the Harvard Public Health Unit for field and laboratory work in epidemiology under wartime conditions and a 100 bed Harvard-Red Cross Hospital for study of wartime communicable diseases. According to an announcement from the university, October 25, he will return to England soon. A native of Minnesota, Dr. Gordon graduated at Rush Medical College in 1925. He has served at the University of Chicago, University of Western Ontario and the Municipal Contagious Disease Hospital, Chicago. He was medical director of the division of communicable diseases of the Herman Kiefer Hospital, Detroit, and from 1934 to 1937 special member of the International Health Division of the Rockefeller Foundation. In 1937 he went to Harvard as professor of preventive medicine and epidemiology. The first Wilder professor was Dr. Milton J. Rosenau, Chapel Hill, N. C., from 1920 until his retirement in 1935. Dr. Zinsser held the title from 1935 until his recent death.

MICHIGAN

State Medical Election.—Dr. Henry R. Carstens, Detroit, was chosen president-elect of the Michigan State Medical Society at its annual meeting in Detroit, September 24, and Dr. Paul R. Urmston, Bay City, was installed as president. Dr. L. Fernald Foster, Bay City, is the secretary. The society will hold its next annual meeting in Grand Rapids.

Immunization Program.—The Muskegon County Medical Society started an immunization program against diphtheria and smallpox among the local children October 1. The program has the approval of the Muskegon Board of Education. Intended for children already enrolled in the public and parochial schools, later the plan is expected to reach children in the preschool age group, it was stated.

Personal.—Dr. Raphael Isaacs, associate professor of internal medicine, University of Michigan Medical School, Ann Arbor, is on a leave of absence for six months to direct a new hematologic service at Michael Reese Hospital, Chicago. ——Dr. Reed O. Dingman, formerly of Danville, Pa., has been appointed assistant professor of maxillofacial surgery at the University of Michigan Medical School, Ann Arbor. —— An ambulance was recently equipped and sent from Michigan through the British War Relief Society to the British Red Cross in memory of the late Dr. Richard R. Smith, Grand Rapids.

MINNESOTA

Minnesota Foundation Lecture.—The first annual Minnesota Medical Foundation Lecture will be presented at the University of Minnesota Medical School, Minneapolis, November 12. Conrad A. Elvehjem, Ph.D., professor of biochemistry, University of Wisconsin, Madison, will lecture on "The Biochemistry of the Vitamin B Complex."

Personal. — Dr. John Willard Hanson, medical fellow in pediatrics, University of Minnesota Hospitals, Minneapolis, has accepted a position in the health service of the University of Kansas, Lawrence, effective September 1. —— Dr. Louis B. Wilson, Rochester, director emeritus of the Mayo Foundation, was the principal speaker at the dedication of the new Museum of Natural History on the University of Minnesota campus, Minneapolis, September 28. Dr. Thomas S. Roberts, Minneapolis, a former practicing physician who has devoted many years to development of the museum, is the director.

Abortionist Sentenced Not to Exceed Eight Years.—Mrs. Hattie Anderson, Mound, pleaded guilty, October 16, to a charge of performing an abortion and was sentenced by Judge Paul S. Carroll of the district court of Hennepin County to a term of not to exceed eight years at hard labor in the Women's Reformatory at Shakopee. A previous conviction in 1933 for a similar offense was a consideration in the sentence. Mrs. Anderson performed the operation on a 21 year old Wisconsin girl, receiving $25 for her services. The girl was taken to a hospital, where she died, October 8, after having identified the defendant. On the earlier conviction Mrs. Anderson was sentenced to a term of not to exceed eighteen months in the Women's Reformatory but was placed on probation. She violated this probation by performing a subsequent abortion and on Feb. 21, 1936, her stay of sentence was vacated. She served fourteen months and eighteen days for that crime.

NEVADA

State Medical Election.—Dr. George R. Magee, Yerington, was named president-elect of the Nevada State Medical Association at the annual meeting, October 11, and Dr. Henry A. Paradis, Sparks, became president. Dr. Horace J. Brown, Reno, continues as secretary. Next year's meeting will be in Elko, September 26-27.

NEW JERSEY

Society News. — Dr. Norman H. Plummer, New York, addressed the Morris County Medical Society, Greystone Park, October 17, on "Treatment of Pneumonia."——Dr. Robert E. Buckley, New York, addressed the Hudson County Medical Society, Hoboken, October 1, on "Removal of the Larynx for Carcinoma."——Dr. Jay Arthur Myers, Minneapolis, addressed the Bergen County Medical Society, Bergen Pines, October 8, on "Follow-Up Work in Tuberculin Testing Surveys."——Dr. Isidor S. Ravdin, Philadelphia, addressed the Cumberland County Medical Society at Jericho, October 8, on "Problems of Biliary Tract Surgery."

State Society Offers Prize.—The Medical Society of New Jersey has recently authorized an award of $100 for an essay submitted by a member of the society. The winner is to be determined by a committee of five members of the society. Manuscripts for the 1941 award must be submitted to the secretary's office before April 15, 1941. In addition to the prize, the winner will receive an invitation to present his contribution before the annual meeting of the society.

NEW YORK

Society News.—Speakers at the quarterly meeting of the Ontario County Medical Society, which was held in conjunction with the ninetieth anniversary of the founding of the Clifton Springs Sanitarium and Clinic, October 8, were Drs. Marion A. Blankenhorn, Cincinnati, on "Modern Treatment of Nutritional Disease"; Joseph C. Doane, Philadelphia, "Peripheral Vascular Disease"; Ross Golden, New York, "Diagnosis and Treatment of Intestinal Obstruction by the Miller-Abbott Tube," and Donald Guthrie, Sayre, Pa., "Use of Silk in Surgery."——Dr. Thomas O. Gamble, Albany, addressed the Medical Society of the County of Albany, October 23, on "Cesarean Section." —— Dr. Irvine McQuarrie, Minneapolis, addressed the Medical Society of the County of Monroe, October 15, on "Effect of the War on Civilian Health in China." ——The Broome County Medical Society and the Binghamton City Hospital have started the Broome County Medical Library, with rooms at the hospital.

New York City

Incubator Babies at the World's Fair.—Dr. Martin A. Couney, who has been in charge of the infant incubators at the New York World's Fair, recently made a report of results of the care of the infants. Ninety-six babies were cared for during the two years and ten, or 10.4 per cent, died. Of these five arrived at the incubator station in such condition that there was no possibility of saving them. The length of gestation of the infants was as follows: six months nine infants, six and a half months eighteen, seven months thirty-seven, seven and a half months nine, eight months twenty, eight and a half months one, and unknown time two. Classified according to weight the babies were kept in incubators for the following average periods: those from 800 to 1,000 Gm. ninety-one and one third days, from 1,001 to 1,250 Gm. seventy days, from 1,251 to 1,500 Gm. fifty-three days, from 1,501 to 1,750 Gm. forty and a half days and from 1,751 to 2,100 Gm. twenty-nine days. Statistics on the mortality according to weight showed that 27 per cent of the smallest babies died and none of the largest ones. Four of those who died were six and a half month babies and six were seven month babies.

OKLAHOMA

First Conference of County Secretaries. — The first annual conference of secretaries of county medical societies of the Oklahoma State Medical Association was held in Oklahoma City, October 27. Mr. Harvey Sethman, executive secretary of the Colorado State Medical Society, Denver, and Dr. Holman Taylor, secretary of the State Medical Association of Texas, Fort Worth, were guest speakers. Mr. Sethman discussed "The Relationship of the Medical Profession to the Economic and Political Problems of Today" and Dr. Taylor, "The Necessity of Cooperation Between County Medical Societies and the Executive Office." Subjects discussed included membership, programs, county societies and the Farm Security Administration, hospital insurance and medical service plans, medical preparedness, public relations and county health units.

OREGON

Society News.—Drs. Wendell H. Hutchens and Thomas S. Saunders Jr. addressed the Multnomah County Medical Society, Portland, October 2, on "Some Responsibilities of Physicians in Premarital Examinations" and "The Five Day Treatment of Early Syphilis" respectively. Dr. Richard B. Adams, Portland, reported on the recent meeting of the house of delegates of the Oregon State Medical Society.

Personal.—Dr. Charles T. Chamberlain, clinical professor of otology, rhinology and laryngology at the University of Oregon Medical School, Portland, has retired with the title of emeritus professor.——Dr. Harold L. Blosser, Portland, was recently appointed a member of the state board of medical examiners to succeed Dr. Joseph F. Wood, resigned, it is reported. ——Dr. Alexander Bradfield, Tillamook, has been appointed health officer of Tillamook County and Dr. John R. Seeley, formerly of Fresno, Calif., of Coos County.

PENNSYLVANIA

Society News.—Dr. George S. Frauenberger, Philadelphia, addressed the Lebanon County Medical Society, Lebanon, October 8, on "Modern Infant Feeding."——Dr. Jacob Goldblum, Uniontown, addressed the Fayette County Medical Society in Uniontown, October 10, on "Latest Advancement in Radiography." —— Drs. Leo D. O'Donnell and William J. Fetter, Pittsburgh, addressed the Cambria County Medical Society, Johnstown, October 10, on "Trauma of the Knee Joint" and "Rheumatoid Arthritis" respectively.

TENNESSEE

Society News.—Dr. John Shelton Horsley, Richmond, Va., was the guest speaker at a meeting of the East Tennessee Medical Association in La Follette, September 12-13, on "Diagnosis and Treatment of Stomach Trouble." —— Dr. William R. Cate, Nashville, addressed the Davidson County Medical Society, Nashville, October 15, on "Arteriosclerotic Heart Disease."——Drs. Fay B. Murphey Jr. and Howard M. Ausherman, Chattanooga, addressed the Chattanooga and Hamilton County Medical Society, October 17, on "Medical Aspects of Gallbladder Disease" and "Choice of Anesthesia" respectively. ——Speakers at a meeting of the Dyer, Lake and Crockett Counties Medical Society, Dyersburg, October 2, included Drs. De Witt T. Holland, Newbern, on "Toxemia of Pregnancy" and Edward B. Smythe, Tiptonville, "Treatment of Acute Respiratory Infections."

UTAH

State Medical Election.—Dr. John R. Anderson, Springville, was chosen president-elect of the Utah State Medical Association at the annual meeting in Salt Lake City in August and Dr. Alfred C. Callister, Salt Lake City, became president.

VERMONT

Personal.—Dr. Edward James Rogers, Pittsford, superintendent of the Vermont Sanatorium, received the honorary degree of doctor of science from Middlebury College, Middlebury.

State Medical Election.—Dr. Ernest H. Buttles, Burlington, was named president-elect of the Vermont State Medical Society at the annual meeting in Rutland, October 11, and Dr. Albert M. Cram, Bridgewater, became president. The next annual session will be in Burlington.

WISCONSIN

State Medical Election. — Dr. Gunnar Gundersen, La Crosse, was named president-elect of the State Medical Society of Wisconsin at the annual meeting in Milwaukee in September, and Dr. Ralph P. Sproule, Milwaukee, became president. The 1941 meeting, at which the society will celebrate its centennial, will be held in Madison.

Physicians' Bags Stolen.—Dr. Henry W. Kleinschmit, Oshkosh, reports that his car and that of another physician were entered while they were in a parking lot at Whiting, Ind., October 21, and among other things the physicians' bags were stolen. Dr. Kleinschmit's name was engraved on the lockplate of the bag, on his sphygmomanometer and on a prescription pad holder.

Society News. — At the second meeting of the recently organized Wisconsin Tuberculosis Society, Statesan, September 17, the speakers included Drs. George C. Owen, Oshkosh, on "The Prognostic Significance of Positive Gastric Aspiration in the Treated Patient"; David D. Feld, Wauwatosa, "Cavity Drainage," and Henry C. Sweany, Chicago, "Chemotherapy in Tuberculosis."——Drs. Irving I. Cowan and Hans W. Hefke addressed the Milwaukee Society of Clinical Surgery, October 29, on "Lipiodol Injection of Bile Ducts" and "Diagnosis and Therapy of Bone Tumors" respectively. —— Dr. Frederick A. Willius, Rochester, Minn., addressed the Medical Society of Milwaukee County, October 11, on coronary disease.

PUERTO RICO

Personal. — Dr. Luis M. Morales, San Juan, has been appointed a member of the Advisory Pardon and Parole Board of Puerto Rico.

Society News.—At the annual meeting of the Ponce District Medical Society, September 22, the speakers were Drs. Lorenzo A. Balasquide, Ponce, on "The Diet of Pregnant Women in Relation to Labor"; Luis A. Passalacqua, Ponce, "Neoprontosil in the Treatment of Empyema"; Americo Serra, Ponce, "Perforated Peptic Ulcer Complicated with Acute Appendicitis"; Capt. Howard W. Doan, M. C., U. S. Army, "Military Medicine," and Dr. Albert V. Hardy, San Juan, "Etiology and Epidemiology of Acute Diarrheal Diseases."—— Dr. Winfred Overholser, medical superintendent of St. Elizabeths Hospital, Washington, D. C., addressed the San Juan District Medical Society, October 7, on "The Psychiatrist in Court." —— Dr. Gabriel Tucker, Philadelphia, addressed the Puerto Rico Medical Association recently on "Tumors of the Larynx with Special Reference to the Treatment of Carcinoma."

GENERAL

American Physicians' Registration in Great Britain.—The General Medical Council of Great Britain is now authorized to register doctors of Canada and the United States in the Emergency Medical Service for the period of the war, the *Lancet* reported September 28. Conditions of emergency registration are that the applicant is a British subject or a citizen of the United States and that he holds some medical degree or diploma recognized by the General Medical Council as furnishing a sufficient guaranty of the requisite knowledge and skill for the efficient practice of medicine, surgery and midwifery.

Army Medical Library Wishes Reprints.—An announcement from the Army Medical Library in Washington, D. C., by Col. Harold W. Jones, librarian, states that the Army Medical Library is glad to have reprints of articles sent by authors. All such reprints are placed in a special collection and are catalogued by the name of the author. Thus they form a ready bibliography of the work of any given writer and a valuable supplementary source of material when the original volume of publication is temporarily unavailable at the bindery or on loan. Authors would do well to send two reprints of each of their writings to the Army Medical Library for this purpose.

Special Society Elections. — Dr. Ralph Irving Lloyd, Brooklyn, was chosen president-elect of the American Academy of Ophthalmology and Otolaryngology at the annual meeting in Cleveland, October 9. Dr. Frank R. Spencer, Boulder, Colo., will take office as president next January. Vice presidents elected were Drs. Everett L. Goar, Houston, Texas; James M. Robb, Detroit, and Ralph O. Rychener, Memphis, Tenn.——Dr. John L. Rice, health commissioner of New York City, was named president-elect of the American Public Health Association at the annual meeting in Detroit, October 10, and Dr. Waller S. Leathers, Nashville, Tenn., was installed as president. The following were elected vice presidents: Drs. Robert D. Defries, Toronto; Carlos E. Finlay, Habana, Cuba, and Selskar M. Gunn, C.P.H., New York. The 1941 meeting will be in Atlantic City, N. J.

Conference on Industrial Health.—The first American Conference on Industrial Health will be held at Chicago Towers, Chicago, November 14. The theme of the meeting will be "Practical Value and Application of Industrial Health Work." At the luncheon session the speakers will be Drs. Volney S. Cheney, Chicago, on "The American Conference on Industrial Health" and Paul A. Neal, Washington, D. C., "Industrial Health and the National Defense." The dinner meeting will be addressed by Dr. Morris Fishbein, Chicago, Editor of THE JOURNAL, on "Industrial Health and the General Practitioner" and Major John L. Griffith, "The Humanitarian Appeal of Industrial Health." The American Conference on Industrial Health was recently incorporated, not for profit, under the laws of the state of Illinois. This meeting is sponsored by the American Association of Industrial Physicians and Surgeons in collaboration with other interested groups.

Cancer Research Fellowships Available.—The Finney-Howell Research Foundation, Inc., announces that all applications for fellowships for next year must be filed in the office of the foundation, 1211 Cathedral Street, Baltimore, by January 1. Applications received after that date cannot be considered for 1941 awards, which will be made March 1. The foundation was provided for in the will of the late Dr. George Walker, Baltimore, to support "research work into the cause or causes and the treatment of cancer." The will directed that the surplus income from the assets of the foundation together with the principal sum should be expended within a period of ten years to support a number of fellowships in cancer research, each with an annual stipend of $2,000, "in such universities, laboratories and other institutions, wherever situated, as may be approved by the Board of Directors." Fellowships carrying an annual stipend of $2,000 are awarded for one year with the possibility of renewal up to three years; when deemed wise by the board of directors, special grants of limited sums may be made to support the work carried on under a fellowship.

New Surgical Investigative Society. — The Surgical Investigative Society of the South was recently organized "to exchange ideas and study advances in the field of surgery." Officers include Drs. Ira A. Ferguson, Atlanta, Ga., president; Michael E. DeBakey, New Orleans, vice president, and David Henry Poer, Atlanta, secretary-treasurer. It is planned to hold annual meetings in October, and Baltimore was chosen

for the 1941 session. At its first meeting at Vanderbilt University School of Medicine, Nashville, Tenn., October 5-6, the following program was presented:

Dr. Samuel McLanahan, Baltimore, Use of Sulfanilamide, Sulfapyridine and Sulfathiazole.
Dr. Richard T. Shackelford, Baltimore, Peritoneoscopy.
Dr. John V. Goode, Dallas, Texas, Transverse Abdominal Incision.
Dr. Clarence E. Gardner Jr., Durham, N. C., Use of the Digital Oscillometer in Peripheral Vascular Diseases.
Dr. W. Paul Sanger, Charlotte, N. C., Lobectomy in Bronchiectasis (movie in color).
Dr. DeBakey, Wound Infection and Wound Healing.
Dr. Barney Brooks, Nashville, Effects of Pressure and Temperature on Ischemic Necrosis.
Dr. Alfred Blalock, Nashville, Activities of the National Research Council in Preparedness.
Dr. James R. Dawson Jr., Nashville, Rabies.
Ann S. Minot, Ph.D., and Dr. Katharine Dodd, Nashville, Shock in Children.
Dr. George S. Johnson, Nashville, Malignant Tumors of the Jaw.

Fellowships in the Medical Sciences. — Fellowships in the medical sciences, similar to those which have been administered by the Medical Fellowship Board of the National Research Council since 1922, will again be available for the year beginning July 1, 1941. These fellowships, supported by grants from the Rockefeller Foundation to the National Research Council, are designed to provide opportunities for training and experience in research in all branches of medical science. They are open to citizens of the United States or Canada who possess an M.D. or a Ph.D. degree and are intended for recent graduates who are not yet professionally established. In addition to these fellowships the Medical Fellowship Board announces two new groups of research fellowships, made available through a grant from the National Foundation for Infantile Paralysis, Inc. The first group, open to applicants who hold either the Ph.D. or M.D. degree, is for the purpose of providing opportunities for special training and experience in the study of filtrable viruses. The second group, open only to graduates in medicine who have completed one or more years of hospital experience in clinical surgery and are planning a career in orthopedic surgery, is designed to provide opportunities for training and research in those basic medical sciences which will be of particular value in furthering progress in the field of orthopedic surgery.

Fellows will be appointed at a meeting of the Medical Fellowship Board about March 1. Applications to receive consideration at this meeting must be filed on or before January 1. Appointments may begin on any date determined by the board. For further details concerning these fellowships address the Secretary of the Medical Fellowship Board, National Research Council, 2101 Constitution Avenue, Washington, D. C.

Meeting of Southern Medical Association.—The thirty-fourth annual meeting of the Southern Medical Association will be held in Louisville, Ky., November 12-15, under the presidency of Dr. Arthur T. McCormack, Louisville. On the first day, local physicians will present programs for general and sectional meetings. Among the speakers from states outside those included in the membership of the association will be:

Dr. Nathan B. Van Etten, New York, President of the American Medical Association, An American Health Program.
Dr. Don C. Sutton, Chicago, Interrelation Between the Vitamin B Complex and the Anterior Lobe of the Pituitary Gland.
Dr. Albert Graeme Mitchell, Cincinnati, What Has Mathematics to Do with Pediatrics?
Dr. Albert F. R. Andresen, Brooklyn, Gastrointestinal Allergy: Present Status.
Dr. Edward M. Livingston, New York, Use of Endogastric Applicators in Treatment of Cancer of Stomach.
Dr. James H. Mitchell, Chicago, Differential Diagnosis of Dermatoses of Hands and Feet.
Dr. Thomas E. Jones, Cleveland, Early Diagnosis and Treatment of Carcinoma of Rectum.
Dr. Hiram Winnett Orr, Lincoln, Neb., Importance of Primary Care in Treatment of Compound Fractures.
Dr. Robert A. Kimbrough Jr., Philadelphia, Treatment of Uterine Prolapse.
Dr. Edward L. Cornell, Chicago, Treatment of Common Complications of Pregnancy.
Dr. Vincent J. O'Conor, Chicago, Treatment of Malignant Tumors of the Adult Kidney.
Dr. Harry E. Bacon, Philadelphia, Surgical Treatment of Lymphogranulomatous Strictures of Rectum.
Dr. Sanford R. Gifford, Chicago, Treatment of Paralytic Strabismus.
Dr. Edward H. Campbell, Philadelphia, Fenestration of the Labyrinth in Chronic Conductive Deafness: An Analysis of Results Obtained.
Dr. Edward B. Tuohy, Rochester, Minn., Clinical Use of Intravenous Anesthesia Alone and in Combination with Other Anesthetics: A Method of Anesthesia Eliminating the Hazards of Fire and Explosion.
Dr. Harry S. Mustard, New York, Education of Public Health Personnel.

There will be a public session Tuesday evening, November 12, at which the speakers will be Drs. James E. Paullin, Atlanta, Ga., on "Syphilis Control in National Preparedness"; Irvin Abell, Louisville, "The Responsibility of Medicine in War and Peace," and Alphonse M. Schwitalla, S.J., St. Louis, "Society's Debts to the Doctor." This year for the first time the association will have a hobby exhibit.

PHILIPPINE ISLANDS

University News.—The *Journal of the Philippine Islands Medical Association* reports that a postgraduate school has been established in the University of the Philippines College of Medicine, Manila. Dr. Antonio G. Sison, dean of the college of medicine, has been appointed director and Dr. Agerico B. M. Sison, assistant professor of medicine, secretary of the new school.

Personal. — Drs. Maria Matias, Manila, and Mariano O. Marfori, Calauan, have been appointed members of the board of medical examiners. Dr. Fernando B. Duran, Caloocan, who was reappointed, was elected chairman.——Dr. Mariano C. Icasiano was recently appointed health officer of Manila in connection with the establishment of a new city department of health and welfare. —— Dr. Emilio Bulatao, Manila, was recently promoted to be head of the department of physiology and biochemistry of the University of the Philippines College of Medicine to succeed Dr. Isabelo Concepcion, Pasay.

CANADA

Society News.—Dr. Edward Murray Blair, Vancouver, was elected president of the British Columbia Medical Association at the annual meeting at Nelson in September, and Drs. Cecil H. Hankinson, Prince Rupert, and Alfred H. Spohn, Vancouver, were elected vice presidents.——At the annual meeting of the Ontario Association of Pathologists, September 21, in Kingston, the speakers included Drs. Joseph F. A. McManus, Baltimore, on "'Regulation of Blood Flow in the Afferent Arteriole of the Kidney Glomerulus" and Leslie S. Jolliffe, Boston, "Reticulum-Cell Sarcoma of the Humerus."

LATIN AMERICA

Society News.—The fourth Pan American Red Cross Conference will meet in Santiago, Chile, in December. The previous conferences were held in Buenos Aires, Washington and Rio de Janeiro.

FOREIGN

Prize Awarded. — The University of Berne, Switzerland, has awarded its prize for research on encephalitis (THE JOURNAL, August 3, p. 395) to Dr. Beppino Disertori, Trento, Italy, the *British Medical Journal* reports.

British Journal 100 Years Old.—The *British Medical Journal* published its centennial number October 5. The journal was first published as the *Provincial Medical and Surgical Journal,* whose first issue appeared Oct. 3, 1840. The name was changed in 1853 to the *Association Medical Journal* and finally in 1857 to the present title. It was not at first announced as the organ of the British Medical Association, but in 1844 it passed definitely under the control of the association, then known as the Provincial Medical and Surgical Association. The centennial number has several special features, although the war precluded publication of a large special number. There is a retrospective article by Sir D'Arcy Power, long a contributor; a reproduction of the first page of the first issue of the journal containing an "introductory address" explaining its purposes, and numerous congratulatory messages.

Deaths in Other Countries

Dr. Vittorio Putti, professor of clinical orthopedic surgery and dean of the school of medicine of the University of Bologna, Italy, and director of the Rizzoli Institute of Orthopedics in Bologna since 1914, died November 1, aged 60. Dr. Putti was an honorary fellow of the American College of Surgeons. He had been since 1917 editor of *La Chirurgia degli organi di movimento,* published under the auspices of the Rizzoli Institute.

CORRECTION

La Traviata Instead of La Bohème.—In his paper on "The Drama of Tuberculosis" in THE JOURNAL, October 12, page 1272, Dr. James A. Miller stated that the story of La Dame aux camélias was dramatized in the opera La Bohème. This should have been the opera La Traviata.

Foreign Letters

LONDON

(From Our Regular Correspondent)

Oct. 5, 1940.

London Hospitals Carry on

The indiscriminate bombing of London has inflicted considerable damage on the hospitals, of which twenty-five have been hit, some more than once. Nearly all have had windows broken by shell explosions. Doctors and nurses have been killed. But the work of the hospitals goes on without interruption, except that evacuation has sometimes been necessary. There has been no grumbling and no panic, though the wounded have often to be treated while bombs are falling. Mr. Malcolm Macdonald, minister of health, has paid a tribute to their work in which he said that no feature of London's superb resistance to the present ordeal surpassed the way in which the hospitals were performing their duty. Doctors and nurses had risen completely to this historic occasion. Not only by day but at all hours of the night they have received patients without any interruptions except those inflicted by the enemy. Sometimes a hospital has had to evacuate its patients in the middle of the night and that difficult operation has been carried out with remarkable speed and smoothness. Occasionally a ward has been struck, and then the rescue work has been as heroic and devoted as that of any of the civilian soldiers in this war. Thousands of lives had been thus saved in the last few weeks alone. There was a mistaken impression that the government had taken over the hospitals for the duration of the war. They of course were paying for war casualties, both military and civilian, and also for maintaining beds ready to receive them, but they were not contributing for the normal work of providing for the treatment of the sick poor. If they were vital before the war, they were doubly vital now in their new role of refuge, not only for the victims of the incessant bombardment but also for those who were ailing and could not be moved farther afield. Their work was in the very front line of our war effort.

Guy's Hospital may be taken as another example. From the start of the offensive a steady stream of casualties began to arrive. Almost all were suffering from shock, traumatic as well as mental. Not a few had seen relatives fall victims to the bombs. In the majority of cases the immediate problem was resuscitation. Some apparently lifeless persons made a dramatic response. Many of these suffered from multiple perforating wounds of the chest and abdomen, with head injuries and burns. They were soon removed to the operating rooms. To avoid congestion of the wards, as soon as patients who could be moved had sufficiently recovered they were taken in stretcher busses to base hospitals. The students and nurses worked with the greatest coolness and efficiency and, when their work was over, resorted to an underground room, safe from the bombers, to enjoy a well earned rest until the next stream of casualties arrived.

American Dental Ambulance Presented to Britain

The interesting ceremony of the presentation of a dental ambulance, the gift of the American dental profession, took place on the Horse Guards Parade. The ambulance is equipped as an emergency operating room where injuries to the face and jaws can be given immediate attention. It will be manned by a plastic surgeon, a dental surgeon, a dental mechanic and an anesthetist, thus providing the Emergency Hospital Service with the means of sending a specialized team to treat on the spot some disfigured civilian or soldier unfit to be moved. In making the presentation Dr. C. W. Roberts said that many of the donors had visited this country, where they received a cordial welcome. An opportunity to seal this bond of friendship had been created by the war, of which the American dental profession was proud to avail itself. He was the spokesman of countless Americans whose hearts were with the British people in their hour of destiny.

In accepting the ambulance on the part of the Ministry of Health, Sir Harold Gillies, consultant adviser to the ministry in maxillofacial surgery, said that the gift was a superb gesture of the American dental profession and a most valuable addition to the equipment of the maxillofacial units. On this great occasion he would like to pay tribute to all their dental friends and well wishers in the United States and in particular to one who was a friend of all their friends in both countries. Thanks were also expressed on behalf of the maxillofacial units of the Emergency Medical Service by Mr. Kelsey Fry and on behalf of the British Dental Association by Sir Frank Pearce.

Wartime Dangers to Health

Since the outbreak of war the government has maintained a close watch on the conditions affecting public health. Steps have been taken to provide against not only the dangers always present in time of war but also those likely to result from changing conditions. Careful consideration has to be given to the effect on public health of such factors as troop movements and evacuation. The resulting increase of population of certain areas throws an additional burden on the health services. Among the measures taken are an extension of the system of chlorination of water, which was already in force before the war in many of the larger urban supplies, the establishment of emergency public health laboratories to assist in the rapid detection and suppression of any outbreak of infectious disease and provision of stocks of substances necessary for the prevention and care of such diseases. In normal times every care is taken to ensure the cleanliness of our milk supplies, but it has been pointed out by the Ministry of Information that in such times as the present, special dangers of infection may exist and that maximum protection can be obtained by boiling all milk that has not been already pasteurized or sterilized. The milk should be brought to a boil and then quickly cooled.

BUENOS AIRES

(From Our Regular Correspondent)

Sept. 27, 1940.

Control of Poliomyelitis in Buenos Aires

In 1936 poliomyelitis began to spread in Buenos Aires and acquire previously unknown characteristics. Whereas in 1933 only 120 cases had been treated in the hospitals in Buenos Aires, eighty-seven of which originated in the city, only thirty-nine were treated in 1934 (twenty-one from the capital) and 127 in 1935. In 1936, however, 643 cases (343 males, 300 females) were discovered by the Asistencia pública. Since poliomyelitis need not be reported, these figures may not be complete. According to a report by Dr. Cibils Aguirre and his associates in the *Revista de medicina y ciencias afines* (**1**:29 [No. 5] 1940) the majority of the cases were observed in the summer season. In February there were 106, in March 279 and in April 150 cases. There were only fifty-four cases in May. Greatest morbidity was found at the ages from 1 to 4 years: 0 to 1, forty-seven cases; 1 to 2, 175 cases; 2 to 3, 135 cases; 3 to 4, seventy-nine cases, with a rapid fall thereafter: 4 to 5, fifty-six cases; 5 to 6, forty-six; 6 to 7, twenty-five, and so on. The mortality rate in the 643 cases amounted to fifty-nine (9.175 per cent). Two or more attacks occurred in the same family forty-one times with a total of eighty-eight cases. In forty cases transmission could be definitely proved. Six persons were demonstrated to be carriers of the bacillus and the cause of infection in twelve persons, though normal themselves.

In view of the high morbidity in 1936, a center of prophylaxis was founded in connection with the Asistencia pública, with Dr. Cibils Aguirre as its director. This center has a laboratory, pediatricians, neurologists, hygienists, social workers, a division for educating the public in health and hygiene and an orthopedic workshop.

A special hospital ward has been opened to infected children in the Hospital Muñiz. All children acutely affected or suspected of the disease are assigned to this ward; nonacute cases are assigned to the Hospital Fernández. Likewise a service for securing convalescent serum has been organized. An institute for radiology and physical therapy and an orthopedic division for the special treatment of these patients have also been made available. The center now commands a stock of 6 liters of convalescent serum. A special commission, consisting of specialists in the various fields, is cooperating to provide expert treatment.

Illegitimacy and the Declining Birth Rate

The Argentine statistician Alejandro E. Bunge recently published an interesting study on questions relating to the birth rate. Illegitimacy has been strikingly high in Argentina for many years and has increased since 1910. The illegitimate birth ratio of 220 per thousand live births in 1910 had increased by 1938 to 282 per thousand, varying greatly, however, in regional distribution. In Buenos Aires, the capital city, the rate is 114 per thousand live births, in some provinces 189, in others 355. In the northern provinces it reaches 474 per thousand. The acme is reached in the province of Corrientes with 560 and in a neighboring territory with 660 illegitimate births in every thousand. The social significance of these figures can be appreciated if contrasted with those for other countries in 1935: Greece 12 per thousand, Portugal and the Netherlands 15, the United States 20 (confined to the white population), Bulgaria and the South African Union (white population) 25, Belgium 29, Ireland 33, Canada 37, Switzerland 39, United Kingdom and Australia 44, Italy and New Zealand 47, Yugoslavia 52, Japan 57, Norway 67, France 70, Germany 78, Denmark 85, Hungary 91, Cuba (white population) 124, Sweden 155, Colombia 225, Austria 252 and Argentina 282 per thousand. With the exception of the other South American countries, nearly all of which have a higher illegitimacy rate, Argentina ranks among the highest in the world. It is the interior of the country that accounts for this disproportion. Bunge attributes this high incidence chiefly to the indifference and ignorance of the population. In the provinces where most illegitimate children are born one might regard them as "naturally legitimate" because family life is maintained. Civil marriage is avoided either because of the expense connected with it or because of the remoteness of the seats of civil registration. This, however, does not explain the increasing illegitimacy rate in the large cities. Here the numerical effect of the decreased birth rate makes itself felt.

The decrease in the birth rate may be judged from the following statistics: In 1910 the birth rate stood at 38.3 per thousand inhabitants; in 1938 it had fallen to 24.3. The loss in actual births between 1910 and 1938 is set at 2,000,000. Compared with the actual number of births in 1910 and 1938, the birth of legitimate children has increased only by 18 per cent, whereas the illegitimate birth rate rose to 63 per cent. The birth rate was observed to decline during 1910-1938 in the levels of the population that were economically and culturally superior. Accordingly, the birth rate fell especially in the strata of society in which illegitimacy is scarcely found to occur. To improve the situation the more privileged classes of society will need to revise their social outlook. Extensive campaigns will have to be conducted in the interior of the country promoting the regularization of numerous loose family relations. This would reduce illegitimacy to a minimum within a few years.

Compulsory Antismallpox Vaccination

By decree of the president of the republic of Bolivia, vaccination and revaccination against smallpox have been made obligatory. Vaccinations are to be carried out during the first three months of each year.

Personals

Dr. Juan Armando Nesi, who has been connected with several hospitals in Buenos Aires, received a fellowship from the Argentine Association for Scientific Progress to continue his studies in anesthesiology at the Mayo Clinic, Rochester, Minn.

Prof. Alejandro J. Pavlovsky of Buenos Aires has left for the United States to work at the Memorial Hospital in New York and with Overholt, Graham, Churchill, Rienhoff and Lahey. He has also been commissioned to study hospital organization in the United States.

Dr. Ricardo Detchessary of Buenos Aires has left for the United States to study the treatment of infantile paralysis.

The atheneum of the chair of the history of medicine in Buenos Aires, in charge of Prof. Juan Ramón Beltrán, has named Prof. Henry Sigerist of Johns Hopkins University and Esmond R. Long as honorary members.

Dr. Juan Ramón Beltrán, professor of the history of medicine in Buenos Aires, has been made an honorary member of the Peruvian Society for the history of medicine.

The honorary degree in sciences was conferred on Dr. Mariano R. Castex, professor of internal medicine in Buenos Aires, by Oxford University.

Dr. Américo Albrieux, head of the endocrinology service in Montevideo, was awarded a fellowship by the Guggenheim Foundation and has left for the United States.

Dr. E. Mira, formerly professor of psychiatry in Barcelona, Spain, and at present residing in Buenos Aires, has been authorized by the faculty of medicine of Buenos Aires to lecture on psychotherapy.

Dr. S. Morra was elected dean of the faculty of medicine at the University of Córdoba in place of Prof. Stuckert, whose tenure of office had expired.

Dr. Aníbal Roberto Valla, associate professor in the surgical clinic directed by Prof. Alejandro Ceballos, has received a year's fellowship from Columbia University, New York, for the study of several fields of surgery, of social medicine and of industrial accidents.

Marriages

Herman Ivan Slate, Matewan, W. Va., to Miss Esther Grace Heiser of New Paltz in Poughkeepsie, September 1.

Frederick Gilbert Medinger, New York, to Miss Jean Isabel Marbarger of Palmyra, Pa., September 14.

Constance Anthony D'Alonzo to Miss Shirley Ruth Bryant, both of Wilmington, Del., October 4.

William Lee Ramseur, Kings Mountain, N. C., to Miss Christine Rhyne of Mount Holly in August.

Samuel Marion Wilkes, Philadelphia, to Miss Margaret Zelene Gray in Laurens, S. C., in July.

Mary Elizabeth Wiltberger to Mr. Norman Summerville, both of Toledo, Ohio, September 21.

Scottie Jackson Wilson, Urbana, Ill., to Miss Mary Jane Lohman of Minneapolis in July.

A. Sidney Barritt Jr. to Miss Margaret Elsie Kearney, both of Brooklyn, September 14.

William J. Miller to Miss Dorothy Menefee, both of Columbus, Ohio, September 21.

Alden B. Oakes, Mount Vernon, Ohio, to Miss Ann Lantz in New York, September 24.

Richard B. Wilson, Atlanta, Ga., to Miss Elizabeth Manes in Austell recently.

Deaths

Kurt Semsroth, Amsterdam, N. Y.; Julius-Maximilians-Universität Medizinische Fakultät, Würzburg, Bavaria, Germany, 1923; member of the American Association of Pathologists and Bacteriologists; assistant in pathology, Cornell University, New York, from 1925 to 1927; pathologist, Western Pennsylvania Hospital, Pittsburgh, from 1927 to 1935; teaching fellow in bacteriology, Harvard University, Boston, 1935-1936; director Montgomery County Laboratories since 1936; associate in pathology and bacteriology, 1936-1937, and associate in pathology at Albany (N. Y.) Medical College since 1937; pathologist on the staff of the Amsterdam City Hospital and St. Mary's Hospital; aged 41; died, September 22, at Raybrook of pulmonary tuberculosis.

Andrew Aldridge Matthews, Spokane, Wash.; University of Maryland School of Medicine, Baltimore, 1900; member of the Washington State Medical Association and the Pacific Coast Surgical Association; past president of the Spokane County Medical Society, North Pacific Surgical Association and the Spokane Surgical Society; fellow of the American College of Surgeons; veteran of the Spanish-American and World wars; surgeon to St. Luke's Hospital and superintendent, 1904-1905; superintendent of the University Hospital, Baltimore, 1902-1903; aged 62; died, September 23, in the Swedish Hospital, Seattle, of carcinoma of the stomach.

Harry Burr Ferris, New Haven, Conn.; Yale University School of Medicine, New Haven, 1890; instructor of anatomy, 1891-1892, assistant professor from 1892 to 1895, professor from 1895 to 1897 and from 1897 to 1933 E. K. Hunt professor of anatomy and since 1933 emeritus professor at his alma mater; member and past president of the Connecticut State Medical Society; member of the American Association of Anatomists; formerly vice president of the New Haven County Medical Society; author of monographs on the anthropology of South American Indians; aged 75; died, October 12.

Leon Shulman ✠ Los Angeles; University of California Medical Department, San Francisco, 1911; formerly associate professor of medicine (tuberculosis) at the College of Medical Evangelists, Los Angeles; member of the American College of Chest Physicians; fellow of the American College of Physicians; served during the World War; for many years on the staff of the Los Angeles General Hospital; at various times on the attending and consulting staff of the Los Angeles Sanatorium, Duarte, and chief of staff and chairman of the medical advisory board; aged 55; died, September 17.

Frank Vander Bogert ✠ Schenectady, N. Y.; University of Pennsylvania Department of Medicine, Philadelphia, 1900; formerly associate in pediatrics at the Albany (N. Y.) Medical College; member of the American Academy of Pediatrics; fellow of the American College of Physicians; chairman of the medical advisory board of the city public schools; for many years on the staff of the Ellis Hospital; aged 66; died, September 24, of coronary thrombosis.

Alfred F. Snyder, Hibbing, Minn.; Rush Medical College, Chicago, 1884; past president of the Delta County Medical Society and the Upper Peninsula Medical Society; formerly member of the board of education of Escanaba, Mich., and city physician; at one time on the staff of St. Francis Hospital, Escanaba; aged 84; died, September 25, of hypostatic pneumonia, arteriosclerosis and hypertension.

David Bigelow Lovell ✠ Worcester, Mass.; College of Physicians and Surgeons, medical department of Columbia College, New York, 1889; member of the American Ophthalmological Society, American Otological Society and the New England Ophthalmological Society; on the staffs of the Memorial and St. Vincent hospitals; aged 75; died, September 17, of arteriosclerotic heart disease.

John T. J. Battle ✠ Greensboro, N. C.; College of Physicians and Surgeons, Baltimore, 1884; member of the county board of health; formerly member of the state board of medical examiners; medical director of the Jefferson Standard Life Insurance Company; formerly member of the board of trustees of Meredith College, Raleigh; aged 81; died, September 30, in the Wesley Long Hospital.

Charles Edwin Heller, Williamsport, Pa.; Jefferson Medical College of Philadelphia, 1890; member of the Medical Society of the State of Pennsylvania; past president of the Lycoming County Medical Society; a trustee, member of the hospital board of managers and medical consultant on the staff of the Williamsport Hospital; aged 75; died, September 24, of carcinoma of the bladder.

Mathew Steward Hosmer, Ashland, Wis.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1882; member of the State Medical Society of Wisconsin; aged 83; on the staffs of the Ashland General Hospital and St. Joseph's Hospital, where he died, September 22, of cardiac decompensation, chronic nephritis and hypertrophy of the prostate.

Francis De Armond Gibbs ✠ Surgeon Lieutenant Commander, U. S. Navy, retired, Arlington, Va.; Georgetown University School of Medicine, Washington, D. C., 1914; entered the navy in 1917 and retired in 1936 for incapacity resulting from an incident of service; aged 50; died, September 22, in the United States Naval Hospital, Washington.

La Salle Archambault ✠ Albany, N. Y.; Albany Medical College, 1902; member of the American Neurological Association; served as instructor, lecturer, adjunct professor and professor of neurology at his alma mater; on the staff of the Albany Hospital; formerly on the staff of the Child's Hospital; aged 61; died, September 28, of pneumonia.

William H. Jessup ✠ Hollis, N. Y.; University of Buffalo School of Medicine, 1900; fellow of the American College of Surgeons; attending surgeon to the Jamaica (N. Y.) Hospital and Creedmoor State Hospital, Queens Village; courtesy surgeon to the Mary Immaculate Hospital, Jamaica; aged 65; died, September 18, of coronary thrombosis.

Alfred Grant Tinney ✠ Surgeon Lieutenant Commander, U. S. Navy, retired, San Diego, Calif.; Jefferson Medical College of Philadelphia, 1903; entered the navy in 1920 and retired in 1935 for incapacity resulting from an incident of service; aged 60; died, September 5, of chronic nephritis, pulmonary tuberculosis and coronary disease.

Joseph Lawrence Stech ✠ Council Bluffs, Iowa; Creighton University School of Medicine, Omaha, 1921; president of the Pottawattamie County Medical Society; instructor of clinical surgery at his alma mater; on the staffs of the Mercy Hospital and the Jennie Edmundson Memorial Hospital; aged 43; died, September 13, of heart disease.

John Brewer Powers, Wake Forest, N. C.; Columbia University College of Physicians and Surgeons, New York, 1907; served during the World War; formerly a captain in the medical corps of the United States Army; aged 59; died, September 22, in the Mary Elizabeth Hospital, Raleigh, of chronic myocarditis and arthritis.

William Gurden Wight ✠ Lansing, Mich.; Michigan College of Medicine and Surgery, Detroit, 1905; past president of the Ingham County Medical Society; on the staff of St. Lawrence Hospital and the Sparrow Hospital, where he was formerly secretary of the board; aged 64; died, September 13, of carcinoma of the pancreas.

Charles Nicholas Olsen Leir, Des Moines, Iowa; Drake University Medical Department, Des Moines, 1901; member of the Iowa State Medical Society and the Radiological Society of North America; served during the World War; aged 70; died, September 22, in the Veterans Administration Facility of chronic myocarditis.

Robert Andrew Buchanan, Lima, Ohio; Cleveland Homeopathic Medical College, 1901; member of the Ohio State Medical Association; formerly member of the board of education; aged 63; on the staffs of St. Rita's Hospital and the Memorial Hospital, where he died, September 19, of diabetes mellitus and chronic nephritis.

John Francis Lynch ✠ Hartford, Conn.; Yale University School of Medicine, New Haven, 1924; fellow of the American College of Surgeons; attending surgeon, St. Francis Hospital; consulting surgeon to the Neuro-Psychiatric Institute of the Hartford Retreat; aged 41; died, September 27, of heart disease.

William Henry Boozer, Anniston, Ala.; Atlanta (Ga.) School of Medicine, 1909; member of the Medical Association of the State of Alabama; aged 54; died, September 16, in the Highland Baptist Hospital, Birmingham, of peritonitis due to perforated duodenal ulcer and chronic cholecystitis.

William Aloysius O'Brien Jr., Passaic, N. J.; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1936; member of the Medical Society of New Jersey; aged 33; died, September 13, in St. Vincent's Hospital, New York, of acute miliary tuberculosis.

Washington Parker Stowe, Miami Beach, Fla.; University of Michigan Medical School, Ann Arbor, 1918; member of the American Society of Clinical Pathologists; on the staff of St. Francis Hospital; aged 50; was found dead, September 14, of illuminating gas poisoning, self administered.

Edward Sylvester Ryan, Sheboygan, Wis.; Wisconsin College of Physicians and Surgeons, Milwaukee, 1898; member of the State Medical Society of Wisconsin; served during the World War; aged 66; died, September 27, in Milwaukee of coronary thrombosis and lobar pneumonia.

Lannes Irving Condit ✠ Detroit; Milwaukee Medical College, 1912; fellow of the American College of Surgeons; served during the World War; aged 55; on the staffs of the Receiving Hospital and the Harper Hospital, where he died, September 24, of lobar pneumonia.

Richard Seaton Tyler, Sweet Springs, Mo.; St. Louis Medical College, 1879; member of the Missouri State Medical Association; at one time member of the state legislature; aged 84; died, September 22, in the John H. Bothwell Memorial Hospital, Sedalia, of myocarditis.

William M. Gurganus, Cordova, Ala.; Chattanooga (Tenn.) Medical College, 1894; member of the Medical Association of the State of Alabama; aged 70; died, September 14, in the Baptist Hospital, Birmingham, of carcinoma of the pancreas with metastases to the liver.

Albert E. Vipond, Montreal, Que., Canada; McGill University Faculty of Medicine, Montreal, 1889; served during the World War; founder of the Montreal Children's Hospital; aged 72; died, September 7, in the Western Division of the Montreal General Hospital.

William Shreve Collier ✠ Trenton, N. J.; University of Pennsylvania Department of Medicine, Philadelphia, 1902; fellow of the American College of Physicians; for many years on the staff of St. Francis Hospital; aged 63; died, September 27, of carcinoma of the rectum.

Carl Guille Brown ✠ Scranton, Pa.; Jefferson Medical College of Philadelphia, 1909; served during the Spanish-American and World wars; on the staff of the Mercy Hospital; aged 61; died, September 14, in the Jefferson Hospital, Philadelphia, of brain tumor.

May Farinholt Jones, West Point, Va.; Woman's Medical College of Baltimore, 1897; formerly connected with the State Woman's College, Columbus, Miss., State Teachers' College, Hattiesburg, Miss., and the Mississippi State Sanatorium; aged 74; died in September.

William K. Muller, Philadelphia; University of Pennsylvania Department of Medicine, Philadelphia, 1900; for many years on the staff of the Germantown Dispensary and Hospital; aged 62; died, September 17, in Kingston, N. Y., of carcinoma of the bladder.

Franklin Joseph Keller, Paterson, N. J.; Long Island College Hospital, Brooklyn, 1899; member of the Medical Society of New Jersey; for many years on the staff of St. Joseph's Hospital; aged 66; died, September 18, in Hawthorne of coronary thrombosis.

James McQueen Ledbetter, Rockingham, N. C.; Vanderbilt University School of Medicine, Nashville, Tenn., 1894; member of the Medical Society of the State of North Carolina; aged 71; died, September 17, of coronary thrombosis and cerebral embolism.

Francis Twining Krusen ✠ Norristown, Pa.; Harvard Medical School, Boston, 1913; Hahnemann Medical College and Hospital of Philadelphia, 1914; aged 51; on the staff of the Riverview Hospital, where he died, September 30, of heart disease.

George A. Whippy, Goshen, Ind.; Hahnemann Medical College and Hospital, Chicago, 1891; member of the Indiana State Medical Association; for many years secretary of the city board of health; aged 70; died suddenly in September of heart disease.

William Joseph Slocum Cremin, Sioux City, Iowa; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1906; on the staff of St. Joseph's Hospital; aged 59; died, September 4, of heart disease.

David P. Luke, Camilla, Ga.; Georgia College of Eclectic Medicine and Surgery, Atlanta, 1911; member of the Medical Association of Georgia; for many years trustee of the school board; aged 54; died, September 14, of coronary thrombosis.

Levi B. Sparkman, Cleveland, Miss.; University of Tennessee Medical Department, Nashville, 1885; member of the Mississippi State Medical Association; Civil War veteran; aged 94; died, September 20, of pneumonia.

Rufus Dillard Moore ✠ Omaha, Texas; Chattanooga (Tenn.) Medical College, 1896; past president of the Morris County Medical Society; for many years health officer; aged 71; died, September 10, of coronary occlusion.

Ernest Wallace Fowler, Los Angeles; College of Physicians and Surgeons, medical department of Columbia College, New York, 1895; aged 68; died, September 19, in the General Hospital of a self-inflicted bullet wound.

Robert Beverly Taylor ✠ San Francisco; Creighton University School of Medicine, Omaha, 1933; aged 33; died, September 15, of injuries received when the horse on which he was riding was struck by an automobile.

Daniel Mosco Randel, Okmulgee, Okla.; St. Louis College of Physicians and Surgeons, 1889; Kansas City (Mo.) College of Medicine and Surgery, 1920; aged 74; died, September 4, in El Paso, Texas, of arteriosclerosis.

John Claude Hull, Port Arthur, Texas; Tulane University of Louisiana School of Medicine, New Orleans, 1926; member of the State Medical Association of Texas; aged 37; died, September 19, of a gunshot wound.

George Joseph Plehn ✠ New York; Cornell University Medical College, New York, 1920; for many years chief of the staff of roentgenology, City Hospital; aged 46; died, September 6, of coronary occlusion.

Harry E. Klingaman, Emmaus, Pa.; Medico-Chirurgical College of Philadelphia, 1911; member of the Medical Society of the State of Pennsylvania; aged 55; died, September 18, of carcinoma of the colon.

Hillary Romines, Garland, Texas; Baylor University College of Medicine, Dallas, 1919; member of the State Medical Association of Texas; aged 60; died, September 14, of a self-inflicted bullet wound.

George L. Bumgarner, Natrona, Pa.; Jefferson Medical College of Philadelphia, 1892; aged 71; died, September 21, in the Wernersville (Pa.) State Hospital of acute retention of the urine with uremia.

Arthur Thomas Whitney, Houlton, Maine; Boston University School of Medicine, 1927; member of the Maine Medical Association; aged 40; was drowned, September 22, when his sailboat capsized.

John Adam Kappelman, Evanston, Ill.; Northwestern University Medical School, Chicago, 1907; served during the World War; aged 60; died, September 23, in St. Francis Hospital of angina pectoris.

Thomas Washington Ferguson, Detroit; Trinity Medical College, Toronto, Ont., Canada, 1901; member of the Michigan State Medical Society; aged 64; died, September 24, of coronary thrombosis.

Dallas Seth Boles, Ava, Ill.; Washington University School of Medicine, St. Louis, 1901; member of the Illinois State Medical Society; aged 63; died, September 12, of heart disease.

Guy Fulton Hobbs, Indianapolis; Indiana University School of Medicine, Indianapolis, 1911; formerly on the staff of the Methodist Hospital; aged 54; died, September 21, of heart disease.

William E. Guntrum, Greenville, Ohio; Medical College of Ohio, Cincinnati, 1893; member of the Ohio State Medical Association; aged 76; died, September 21, of cerebral hemorrhage.

James C. Waddy, Greensboro, N. C.; Meharry Medical College of Walden University, Nashville, Tenn., 1904; aged 57; died, September 21, of cardiac dilatation and cirrhosis of the liver.

William Reginald Sullivan ✠ Merced, Calif.; University of Kansas School of Medicine, Kansas City, Kan., 1935; aged 30; died, September 3, of a self-inflicted bullet wound.

Francis Joseph Abt, Cincinnati; Eclectic Medical College, Cincinnati, 1914; aged 53; died, September 18, of cerebral hemorrhage and diabetes mellitus.

Elisha Grove Anthony ✠ Indianapolis; Physio-Medical College of Indiana, Indianapolis, 1889; aged 72; died, September 28, of coronary occlusion.

Hugh S. Hart, Pamplin, Va.; University College of Medicine, Richmond, 1899; aged 68; died, September 11, of carcinoma of the cervical glands.

Sherman Alonzo Allen, Imogene, Iowa; Northwestern Medical College, St. Joseph, Mo., 1883; aged 88; died, September 7, of uremia.

Irvin Merrill Bierman, Newark, N. J.; Denver College of Physicians and Surgeons, 1908; aged 65; died, September 27, of heart disease.

John Milton Thompson, Walters, Okla.; Dallas (Texas) Medical College, 1903; aged 67; died, September 10.

Bureau of Investigation

BRINKLEY ON THE BRINK? II

In THE JOURNAL for October 19 attention was called to an article in a Little Rock, Ark., newspaper for October 4. which indicated that malpractice suits were catching up with charlatan Brinkley. An item dated October 17 contains not only additional information concerning some of the cases previously mentioned but some new and surprising statements. Apparently default judgments were ordered in two of these suits: Charles F. Allen, administrator of the estate of J. F. Crenwelge, seeking $264,271, and E. P. Lambert, administrator of the estate of Abner Johnson, seeking $90,000. These individuals charged that Dr. Brinkley was responsible for the deaths of Johnson and Crenwelge. Judge Trimble tagged as "not timely" a motion by Dr. Brinkley's lawyers requesting that their client be not required to appear in Little Rock to give depositions, or that the depositions be taken in Del Rio, Texas, the doctor's home. The judge added that the only question was whether Dr. Brinkley wilfully violated an order of the court in failing to appear October 4 and 5 to give depositions. It was claimed that Brinkley had failed to appear in court because a "business crisis" had prevented him from coming to Little Rock. Furthermore, one Tom W. Campbell, representing Brinkley, said that the doctor's business had been "definitely destroyed" by more than twelve damage suits filed in an attempt to "mulct the defendant" and added that the doctor's income had "dwindled from $1,000,000 annually to nothing." He stated, further, that at the time Dr. Brinkley was to have appeared in Little Rock he was conferring with associates in Kansas City, Mo., in an attempt to raise money to pay income tax. Judge Trimble overruled efforts of a Brinkley representative to introduce a deposition by a former employee at the Country Club Hospital which he claimed would show that Dr. Brinkley left Little Rock last July for Memphis and remained in a hotel there until a "recent date." Brinkley is said to have conducted the hospital's business from there.

The fact that Brinkley is encountering all of these difficulties in Little Rock, plus the fact that the article quoted refers to him as "*former* operator of the Country Club Hospital" at Little Rock, has an interesting reflection in a plea signed by the mayor, the president of the Rotary Club, and many other citizens of Del Rio urging the return of their adopted wayward son. The consummation of these unbelievable plans is not yet announced. The plea is reproduced herewith. A few days later the Del Rio *News-Herald*, which, under date of October 23, carried as its principal headline "Brinkley Hospital To Be Located Here." A statement is quoted which, it claimed, was issued by Dr. and Mrs. John R. Brinkley, announcing that they had "permitted some of the business men of Del Rio to incorporate and locate in Del Rio, Texas, The Brinkley Hospital for the purpose of using Doctor Brinkley's famous treatments." Dr. Brinkley claimed, according to the article, that the decision was made "at the urgent plea of hundreds of Del Rio people who say the town is in serious need of the assistance that Dr. Brinkley can give it as a winter resort and health center" (sic).

When Brinkley closed his hospital in Del Rio a number of years ago, one of the principal reasons, according to him, was the efforts of certain individuals to divert to some other doctor patients coming to Del Rio to the Brinkley Hospital. The situation in this regard was dealt with in an article in the *Saturday Evening Post* about Brinkley, by J. C. Furnas, entitled "Country Doctor Goes to Town":

> What happened was that a well established Del Rio surgeon suddenly went off the ethical rails and started advertising over the border station XEPN that he could and would do the famous "compound operation" for only $150—far below Brinkley's bottom price of $360 for the prostate job alone. Then high-pressure men appeared on board the westbound Southern Pacific trains at Uvalde to spot elderly passengers who looked like intending Brinkley customers and persuade them to save money by going to the competing doctor. Presently another group of touts began to rally round at the Del Rio station to rescue backsliders as they left the train. They say that platform was pretty lively back then, what with all the pulling and hauling and the embarrassment of elderly through passengers who had stepped off the train to stretch their legs when perfect strangers rush up and wanted to know if they were suffering from the less decorous ills that Doctor specializes in.
>
> Several times these hostile puller-inners got into gang fights. Some went heeled in the traditional Texas style, in case things got even more serious. Then the local paper began to carry huge advertisements, with no indication of who paid for them, but apparently intended to burlesque the competition with funny pictures and weirdly leering remarks about Ye Olde Prostate Shoppe. Some citizens of Del Rio told me that Doctor had reproached the city fathers pretty severely for letting a rival carry on in this way when he had done so much for the place. But the competition survived the battle, although, since XEPN burned down, it no longer advertises over the air. And it was Doctor who moved.

Shortly before this article appeared in the *Saturday Evening Post*, the Del Rio *News-Herald* for April 8, 1940, published a public notice under the heading "An Ordinance for the Purpose of Prohibiting the Soliciting of Patients by Any Doctor or Person Doing Business in the City of Del Rio, and Defining Certain Terms, Providing for a Penalty and Injunctive Relief, and Providing for Licensing of Carriers of Patients or Other Passengers, and Declaring an Emergency." In line with this, the article in the Del Rio *News-Herald* dated Oct. 23, 1940, includes the following paragraph:

> Dr. Brinkley was very emphatic in stating that any effort "to divert to some other doctor even one patient coming to Del Rio for treatment in the Brinkley Hospital would immediately cause him to withdraw his support of Del Rio," and he indicated such action also probably would cause the hospital here to close immediately.

In view of the statement of Brinkley's attorneys in Little Rock that the doctor's income had "dwindled from $1,000,000 annually to nothing," it is interesting to note in the recent issue of the *News-Herald:* "Dr. and Mrs. Brinkley stated emphatically that 'we own no stock nor do we have anything invested in the Brinkley Hospital, Incorporated,'" adding "The owners will employ trained doctors and nurses and laboratory technicians from the Brinkley staff in Little Rock, Arkansas." The statement continued "and they will bring them to Del Rio to administer the genuine Brinkley treatment." Dr. and Mrs. Brinkley are quoted further as saying that they "will speak favorably over the radio in behalf of the city of Del Rio and its winter climate and announce the opening of the Brinkley Hospital in Del Rio, Texas, and will do all in their power to fill the town with tourists, the hospital with patients, and bring prosperity to Del Rio once again."

An Open Letter

— to —

Dr. and Mrs. John R. Brinkley

— from —

Officials, Leading Citizens and Other Friends in Del Rio, Texas, The Home of the Brinkley Hospital for Four Years, Where Thousands of Patients Have Been Treated.

**Del Rio, Texas,
October 15, 1940.**

We, the undersigned, invite and urge Dr. and Mrs. John R. Brinkley to come home to Del Rio, Texas, with their hospital and fine staff of doctors and nurses and technicians where full confidence in them prevails and where they are respected and loved.

We have heard of the lawsuits that have been brought against you and the other difficulties that have been created for you. Knowing the good you have done and are doing suffering humanity, we invite you back to Del Rio to resume your valuable services to the sick and needy.

We, the undersigned, are officials and citizens of Del Rio and Valverde county, Texas, the home of the Brinkley Hospital.

J. S. BRADFORD, Mayor; GROVER C. POOLE, County Judge; AUBREY WALKER, County Treasurer; J. O. BOOTHE, Vice President Del Rio Bank and Trust Co.; W. S. STEVENSON, Vice President Del Rio National Bank; J. A. WALKER, Cashier Del Rio National Bank; JAS. C. NETTS, Secretary Chamber of Commerce; C. B. WARDLAW, President Wool and Mohair Association; PHIL B. FOSTER, City Attorney; GROVER C. POOLE, President Rotary Club; PHILIP W. VAUGHAN, President Lions Club; H. V. ATKINSON, City Secretary; S. B. BUCHANAN JR., County Attorney; ILA B. HONEYCUTT, Assistant City Secretary; H. CONGER JONES, County Surveyor; LUCILLE LOWRIE, City Tax Department; F. J. SCHMIDT, Fire Chief; JOHN L. DODSON, U. S. Commissioner; C. C. BROWN, Superintendent Water Works; JULIAN LaCROSSE, Attorney; A. L. BROWN, Dentist; JOE E. SANDERS, Doctor of Medicine; F. L. CHILDS, Manager Roswell Hotel; THOMAS M. JOHNSON, Doctor of Medicine; REV. S. M. RATLIFF, Pastor First M. E. Church; RAY ROSS, Postmaster.

Can it be that the people of Del Rio will consent to such exploitation when a jury in that very town sustained the accusation of charlatanism against John R. Brinkley made in *Hygeia* in February 1938? The verdict of this jury was sustained by the Circuit Court of Appeals of the Fifth District. Finally, a review in the way of a petition for certiorari was denied by the Supreme Court of the United States within the past thirty days. Thus Brinkley is definitely on record as a quack and a charlatan.

Queries and Minor Notes

THE ANSWERS HERE PUBLISHED HAVE BEEN PREPARED BY COMPETENT AUTHORITIES. THEY DO NOT, HOWEVER, REPRESENT THE OPINIONS OF ANY OFFICIAL BODIES UNLESS SPECIFICALLY STATED IN THE REPLY. ANONYMOUS COMMUNICATIONS AND QUERIES ON POSTAL CARDS WILL NOT BE NOTICED. EVERY LETTER MUST CONTAIN THE WRITER'S NAME AND ADDRESS, BUT THESE WILL BE OMITTED ON REQUEST.

FREQUENT FEEDINGS IN DIABETES

To the Editor:—**In the treatment of diabetes it has been found that many patients can manage a certain amount of carbohydrate by themselves without taking insulin. They cannot, however, handle enough to supply the necessary daily total calories. Therefore insulin is given to cover this necessary excess, which the body cannot handle. Since the pancreas can furnish enough insulin for a certain amount of sugar at one time yet cannot furnish enough for one whole meal, why not attempt to determine the amount the body can handle at one time and give just that amount in say five or six meals or often enough to make the daily total requirement of calories, rather than giving the whole amount in the usual three meals? I have seen nothing in the literature concerning multiple small meals in the treatment of diabetes and I have not had the opportunity to try this myself as yet. Has this been tried? If so what were the conclusions as to why it didn't work? Perhaps for some reason that I don't know this is unscientific, yet I have mentioned it to a number of my friends and no one seems to know whether it would work or not. What do you think of the idea?**

Robert A. Peterman, M.D., Hicksville, N. Y.

ANSWER.—Frequent feedings of carbohydrate favor its utilization. Indeed, frequent feedings of carbohydrate to an individual supplied with insulin, endogenous or exogenous, constitute a sort of Staub-Traugott or Exton phenomenon. Frequent feedings are always useful for the patient taking protamine zinc insulin, for several reasons: 1. The lowering of the total carbohydrate at a meal, by the taking away of a small quantity for lunches, brings the carbohydrate at that meal to a level which the slowly acting protamine zinc insulin can control. 2. These feedings also protect against the danger of reactions between meals when the blood sugar is low. 3. It is always advantageous in the administration of carbohydrate to a diabetic patient to get the benefit which results from the falling tide of a blood sugar curve, because that decidedly favors the utilization of carbohydrate in contrast to a rising blood sugar curve which hinders it. 4. By promotion of oxidation of carbohydrate between meals the development of acidosis is averted. (These statements are taken nearly verbatim from the Treatment of Diabetes Mellitus, by Elliott P. Joslin, Howard F. Root, Priscilla White and Alexander Marble, ed. 7, Philadelphia, Lea & Febiger, 1940, p. 319.)

Experimentally it is of interest that Bertram (Die Zuckerkrankheit, ed. 2, Leipzig, Georg Thieme, 1939, p. 78) recalculated von Holm's experiments with a completely depancreatized dog for a man weighing 60 Kg. The results showed that if insulin ran into the vein of the fasting theoretical man without a pancreas continuously for twenty-four hours he would need but 7.8 units; if at the same time dextrose was injected sufficient to maintain the man's total caloric requirements the amount of insulin necessary to utilize it would be only 48 units.

STRAINING AT STOOL AND RECTAL DISEASE

To the Editor:—**Are the rumors about sitting long on toilet seats before and after or in hopes of obtaining a stool bad and if so why? Can hemorrhoids or a tendency to get them be increased by such action? Also just what is considered the correct time to try to establish bowel time? What is supposed to be the right height for a bowl? Should the seat be of such a height that the rectum is at a lower level than the knees (in the belief that a sharper jackknife position makes less straining necessary)? Is there any truth in the idea that sitting on stone stoops or parapets or any cold stone for any length of time increases possibilities of rectal disorders? These questions arise often and an authoritative answer would be appreciated. Joseph Katz, M.D., Cincinnati.**

ANSWER.—Sitting on a toilet seat is in itself no more harmful than sitting on a chair. Straining at stool is, however, another matter. It increases the pressure within the hemorrhoidal veins and tends to evert the rectal mucosa. Whether this in itself can lead to hemorrhoids or other rectal or anal disease is debatable. It appears more likely that straining may aggravate conditions already present but these are primarily due to other factors. When an unusual amount of straining is necessary, attention should be directed to its cause. A hard constipated stool may be amenable to dietary regulation. Local rectal or anal disease may lead to organic or spastic narrowing of the lumen. Straining is then necessary until its underlying cause is removed.

The gastrocolic reflex is generally most active immediately after breakfast and, since this is usually a convenient time for bowel action, many people easily become accustomed to go to stool at this time of day.

A toilet bowl from 15 to 18 inches in height has been found satisfactory for the average adult. This height permits a comfortable position and allows flexion of the trunk toward the thighs when desired. The latter facilitates without much voluntary effort the increase in intra-abdominal pressure which normally precedes a bowel movement.

Sitting on stone or cold surfaces is not likely to have a local effect. There is no conclusive evidence that it causes rectal or anal disease. It may, however, aggravate pathologic conditions already present.

DENTAL CARIES AND HEREDITY

To the Editor:—**Does heredity play any part in dental caries?**

M.D., Illinois.

ANSWER.—This question cannot be answered with finality from present knowledge. The absence of carious lesions in the teeth of one or both parents furnishes no assurance that the children will be free from caries if subjected to environmental circumstances favorable to the disease. The diminished incidence of caries in primitive races is not due to hereditary immunity, as evidenced by the carious activity repeatedly noted with changes in the subject's diet. The preference for certain dishes and types of diet is often handed down from one generation to another, which may suggest hereditary influence that actually is entirely environmental.

While the preponderance of evidence at the present time places the emphasis on the circumstances which permit and favor the production of acid at the site of the lesion and its confinement in these areas for sufficient time and in appropriate state to decalcify the tooth substance, there is little known of the obscure factor possessed by a few individuals which inhibits the production of lesions where favorable environmental circumstances seem to prevail. Whether this factor will be found to be of hereditary nature is a matter of conjecture.

At this time the most that can be said for the role of heredity in the prevention of caries is the nonspecific but unfavorable effect which the form and structure of the teeth as well as the constitutional factors of metabolism and salivary composition may exert on the disease. The form of the tooth bears some relation to the areas favorable for attack. The structure of the tooth appears to have some influence on the rate and manner of progress of the lesion. These are secondary to the active etiologic agent, however, for no physical properties of the teeth have been discovered which prevent the disease. They may affect the intensity demanded of the causative agent to initiate a lesion and the rate at which it progresses.

ALLERGY TO PARASITES

To the Editor:—**In The Journal, July 6, page 74, mention is made of "intracutaneous tests with extracts of common parasites (Ascaris, pinworms and the like)." What is the diagnostic value of these tests and where can these extracts be obtained? I have seen many convulsions in children and young adults clear up after administration of santonin and passage of roundworms. Is this a common experience? If so, what is the cause of the convulsions?**

M.D., West Virginia.

ANSWER.—The only commercially available antigens for the diagnosis of common nematode infections are Ascaris antigen prepared by the Lederle Laboratories and Trichinella antigen marketed by Eli Lilly and Company. The latter antigen is of considerable aid in the diagnosis of trichinosis. Other nematode antigens have been used experimentally but have not come into general use for the diagnosis of parasitisms because of the difficulty in obtaining material and the inconsistencies in the experimental results. Such antigens may be of value in determining sensitization to various worm proteins but are not of practical value for the diagnosis of intestinal parasitisms. It is possible that small quantities of various nematode antigens can be obtained for experimental use from laboratories engaged in research on the immunologic aspects of helminthic infections.

Individuals with allergic manifestations who harbor intestinal parasites should be treated for their parasitisms in spite of the results of cutaneous tests with homologous antigens. Except for Trichinella, the diagnosis of the common intestinal parasites in this country should be made by the usual methods of stool examination. Such examination will reveal in most cases the presence of ova or larvae of the intestinal parasites. However, in the case of pinworm infestation the NIH swab (*Am. J. Trop. Med.* **17**:445 [May] 1937) should be used.

A number of the older European investigators have attributed convulsions to Ascaris infections. More recently Leitch (*J. Trop. Med. & Hyg.* **32**:340 [Dec. 2] 1929) attributed convulsions to a toxic principle elaborated by Ascaris. Sensitization, occurring to the extreme degree that it may form ascarid proteins, might also be a cause for convulsions.

APLASTIC ANEMIA

To the Editor:—**For the past six months I have been observing a man of 21 whose chief complaint is weakness, shortness of breath and pallor. The physical examination is completely negative except for the generalized pallor. There is no jaundice or adenopathy and the spleen is not palpable. The past history is inconsequential, as he has had only pertussis and chickenpox. No members of his family have had similar complaints and there is no reason to suspect industrial or any other type of poisoning. He is a farmer and has always led a temperate life. The initial blood count was red cells 1,030,000, hemoglobin 28 per cent, white cells 4,200, polymorphonuclear leukocytes 35 per cent, small lymphocytes 65 per cent. The gastric analysis was normal as studied by the 120 minute fractional method. No blood was found in the stools or gastric juice. The bleeding time was two and one fourth minutes and the coagulation time was two minutes. The platelet count was 57,000. The patient gives no history of hemorrhage at any time. The blood clot retracted normally in one hour. The packed volume of cells is 14 per cent. The volume index of cells is 1.3. The saturation index is 0.9. The Van den Bergh test showed no change. The icterus index is 1. The fragility test showed beginning hemolysis at 44, ending at 34. Many blood smears show nothing striking save the presence of poikilocytes and anisocytes. The sternal puncture revealed 18 per cent polymorphonuclears, 56 per cent small lymphocytes, 2 per cent plasma cells, 10 per cent myelocytes, 10 per cent normoblasts, 2 per cent transitionals and 2 per cent unclassified cells. Roentgenograms of the long bones show no abnormality. The blood Wassermann and Kahn reactions are both negative. Agglutination tests for undulant fever, typhoid, paratyphoid and tularemia are all negative. Since first seeing this patient my endeavor to combat the anemia has included eight blood transfusions, large doses of various iron preparations, liver by mouth and by injection, vitamin therapy, ultraviolet rays, high caloric diet, rest, and extract of bone marrow. The blood transfusions are about the only method of attack that is at all beneficial and they seem to be only temporary. The highest I have found the red count is 2.20 million, but in about ten days after a transfusion it again falls to slightly more than 1 million. There has been no fever whatever except in one seven day period, at which time no cause could be found. It disappeared, however, with the giving of blood. I feel that I am dealing with an odd case of aplastic anemia without hemorrhage and feel justified in keeping up therapy in the hope that regeneration will, or rather might, eventually occur. Any aid as to diagnosis, prognosis or therapy will be appreciated.**

V. D. Goodall, M.D., Clifton, Texas.

ANSWER.—From the history and blood picture as presented, the diagnosis of aplastic anemia seems to be the most likely. The examination appears to be complete and but little can be added. However, the report of the sternal puncture does not include the total white count and does not state whether the marrow is aplastic or shows normal activity. In aplastic anemia the total white count is low. One other possibility should be considered, and that is an atypical form of leukemia. It is conceivable that the cells reported as small lymphocytes actually are atypical micromyeloblasts. These cells should be reexamined with this possibility in mind.

Although it is stated that "there is no reason to suspect industrial or any other type of poisoning," it should be determined whether the patient, who is a farmer, has been exposed to arsenic spray.

The repeated blood transfusions should be continued in the hope that blood regeneration may eventually occur. This is probably the only form of treatment that will be of value.

UNHEALED SINUS OF LEG

To the Editor:—**A man aged 77 with moderately sclerosed arteries has had what was diagnosed as lipoma extending deep into the calf muscle for several years. About one year ago this condition began to show a change whereby the enlargement took on the feeling of fluid or a cyst. This increased rather rapidly in density but not in bulk up to three months ago, when a small incision was made and the serum contents were evacuated. In this serum were many small cheesy masses which the laboratory reported as broken down fat. There were no demonstrable organisms. It still discharges considerably or practically the same amount now as earlier. It saturates a rather bulky dressing daily. By use of probes we find that this has dissected extensively throughout the muscle. Complete surgical dissection therefore would be impossible. Is injection through the sinus of some sclerosing solution a rational procedure and if so what would you suggest?**

M.D., South Dakota.

ANSWER.—If the cavity in this case is lined by endothelium or a serous surface, then and only then would a sclerosing solution seem rational, and in this event any one of the ordinary solutions used for varicose veins would be suitable.

It seems much more likely, however, that this cavity might be lined by granulation tissue, in which event injection of sclerosing solution would not be indicated and might in fact make considerable trouble. The cause of failure to heal of the sinus must rest either on neoplastic tissue or on infection. The presence of neoplastic tissue could be determined by microscopic examination of the cells, if they could be obtained. If it is due to an infection, one should think first of specific infection such as tuberculosis, syphilis, actinomycosis and tularemia. It would seem wise to inject a guinea pig with some of the material if smears reveal no organisms. A Wassermann or Kahn test should certainly be done. If it is a nonspecific infection, whereas excision might be impossible, a rapid radical incision and healing from the bottom might be effective.

HYPERPHORIA

To the Editor:—**A woman aged 51 has never been comfortable with glasses. I gave her corrections: right, plus 125 plus 75 axis 90; left, plus 150 plus 50 axis 120. She has 4 degrees of hyperphoria. I gave her 1 degree prism base down in the right and 1 base up in the left eye. She needs plus 225 add for reading for Jaeger No. 1 at 16 inches. With this correction she is comfortable for the first time with glasses. But when she looks at a near object having more than one color, for instance an advertisement in a magazine, she gets three dimensions. In other words, she sees the picture as though looking through a stereopticon. I have tried changing the prism strength and cannot give her any help. I should state that with her glasses on she gets normal vision. Her perception is normal and she has no fundus changes. Color perception is normal.**

M.D., Michigan.

ANSWER.—With the distance test showing a hyperphoria of four prism diopters, a paresis of a vertically acting muscle should be suspected, and the oculomotor apparatus should be studied with this possibility in mind. Binocular vision at reading distance should also be investigated, as it is not improbable that this particular patient is suppressing the image of one eye in near vision. If, as usually happens, the factors of monocular perspective are stressed by the artist, the sense of depth will be enhanced when colored pictures are viewed with but one eye. The chromatic dispersion in fused flint segments may possibly emphasize this quality.

BLOOD ELECTROLYSIS FOR HYPERTENSION

To the Editor:—**In *American Medicine* for November 1927 there appears (on page 686) an article by Dr. E. Northcott on the use of blood electrolysis in the treatment of hypertension. Can you tell me if this method of treatment has had any extensive trial or if it has any rationale behind it? I have inquired among my colleagues who are specialists in the field but none of them have any knowledge of or experience with the method.**

Laurence B. Chenoweth, M.D., Cincinnati.

ANSWER.—The paper by Northcott in *American Medicine* roughly elaborates a theory based on assumption to explain senescence and hypertension. There are no scientific facts supporting this vague and nebulous concept, and in the last thirteen years thorough investigations have demonstrated that many of his premises and assumptions are actually erroneous. The few cases reported are unconvincing and no control data are presented. There has been no extensive trial of the electrolytic therapy suggested nor is there likely to be, for it is devoid of logic and based on false assumptions.

BARIUM SULFATE IN INTESTINAL TRACT

To the Editor:—**Has any harm been noted from the prolonged use of barium sulfate (1 tablespoon weekly for several months) for the treatment of diverticulitis of the colon and upper intestinal tract? I understand that it is totally insoluble in the gastrointestinal tract, but is it possible for some to be absorbed either in its ingested form or in that of any of its products? If it can be absorbed, how would this product affect the organism?**

M.D., Connecticut.

ANSWER.—No harm has been noted from the prolonged use of chemically pure barium sulfate, although the literature reports numerous instances of poisoning by chemically impure barium sulfate. The soluble salts of barium, such as the chloride, sulfide and carbonate, are especially poisonous. It is to be remembered that there is a commercial form of barium sulfate which is used as an adulterant of white powder or white paints, and this is toxic. The chemically pure barium sulfate (baryum sulfuricum purissimum of the German pharmacopeia) is harmless and passes through the body unchanged. Many physicians would question the rationale of the use of the salt in the treatment of disorders of the intestinal tract. It is highly improbable that some of the salt is absorbed either in its ingested form or in that of any of its products. Even if it were, the amount prescribed would in itself be harmless.

References:

McNally, W. D.: Two Deaths from the Administration of Barium Salts, THE JOURNAL, June 13, 1925, p. 1805.
Golob, Meyer: *Radiology* **22**: 486 (April) 1934.
Savignac, R.: *Arch. d. mal. de l'app. digestif.* **13**: 709, 1923.
Thomas, J. C.: *J. Path. & Bact.* **43**: 285 (Sept.) 1936.

Medical Examinations and Licensure

COMING EXAMINATIONS

NATIONAL BOARD OF MEDICAL EXAMINERS EXAMINING BOARDS IN SPECIALTIES

Examinations of the National Board of Medical Examiners and Examining Boards in Specialties were published in THE JOURNAL, November 2, page 1570.

BOARDS OF MEDICAL EXAMINERS

ALABAMA: Montgomery, June 17-19. Sec., Dr. J. N. Baker, 519 Dexter Ave., Montgomery.

CALIFORNIA: *Oral examination* (required when reciprocity application is based on a state certificate or license issued ten or more years before filing application in California), Los Angeles, Dec. 11. Sec., Dr. Charles B. Pinkham, 1020 N St., Sacramento.

CONNECTICUT: * *Written.* Hartford, Nov. 12-13. *Endorsement.* Hartford, Nov. 26. Sec., Dr. Thomas P. Murdock, 147 W. Main St., Meriden. *Homeopathic.* Derby, Nov. 12-13. Sec., Dr. Joseph H. Evans, 1488 Chapel St., New Haven.

DELAWARE: July 8-10. Sec., Medical Council of Delaware, Dr. Joseph S. McDaniel, 229 S. State St., Dover.

DISTRICT OF COLUMBIA: * Washington, Nov. 11-12. Sec., Commission on Licensure, Dr. George C. Ruhland, 203 District Bldg., Washington.

FLORIDA: * Tampa, Nov. 18-19. Sec., Dr. W. M. Rowlett, Box 786, Tampa.

HAWAII: Honolulu, Jan. 8-11. Sec., Dr. James A. Morgan, 48 Young Building, Honolulu.

INDIANA: Indianapolis, June 17-19. Sec., Board of Medical Registration and Examination, Dr. J. W. Bowers, Citizens Trust Bldg., Fort Wayne.

IOWA: Des Moines, Dec. 9-11. Dir., Division of Licensure and Registration, Mr. H. W. Grefe, Capitol Bldg., Des Moines.

KANSAS: Topeka, Dec. 10-11. Sec., Dr. J. F. Hassig, 905 N. Seventh St., Kansas City.

KENTUCKY: Louisville, Dec. 3-5. Sec., State Board of Health, Dr. A. T. McCormack, 620 Third St., Louisville.

MAINE: Portland, Nov. 12-13. Sec., Board of Registration of Medicine, Dr. Adam P. Leighton, 192 State St., Portland.

MARYLAND: *Regular.* Baltimore, Dec. 10-13. Sec., Dr. John T. O'Mara, 1215 Cathedral St., Baltimore. *Homeopathic.* Baltimore, Dec. 10-11. Sec., Dr. John A. Evans, 612 W. 40th St., Baltimore.

MASSACHUSETTS: Boston, Nov. 12-14. Sec., Board of Registration in Medicine, Dr. Stephen Rushmore, 413-F State House, Boston.

MISSISSIPPI: *Reciprocity.* Jackson, December. Asst. Sec., State Board of Health, Dr. R. N. Whitfield, Jackson.

MONTANA: *Reciprocity.* Helena, March 31. *Written.* Helena, April 1. Sec., Dr. S. A. Cooney, 216 Power Block, Helena.

NEW HAMPSHIRE: Concord, March 13-14. Sec., Board of Registration in Medicine, Dr. T. P. Burroughs, State House, Concord.

NEW YORK: Albany, Buffalo, New York and Syracuse, Jan. 27-30. Chief, Bureau of Professional Examinations, Mr. Herbert J. Hamilton, State Education Department, 315 Education Bldg., Albany.

NORTH CAROLINA: *Reciprocity.* Durham, Dec. 10. Sec., Dr. W. D. James, Hamlet.

NORTH DAKOTA: Grand Forks, Jan. 7-10. Sec., Dr. G. M. Williamson, 4½ S. Third St., Grand Forks.

OHIO: Columbus, Dec. 9-12. Sec., Dr. H. M. Platter, 21 W. Broad St., Columbus.

OKLAHOMA: * Oklahoma City, Dec. 11. Sec., Dr. James D. Osborn Jr., Frederick.

OREGON: * Portland, Jan. 14-16. Exec. Sec., Miss Lorienne M. Conlee, 608 Failing Bldg., Portland.

PENNSYLVANIA: Philadelphia, January. Acting Sec., Bureau of Professional Licensing, Miss Marguerite G. Steiner, 358 Education Bldg., Harrisburg.

SOUTH CAROLINA: Columbia, Nov. 12. Sec., Dr. A. Earle Boozer, 505 Saluda Ave., Columbia.

SOUTH DAKOTA: * Pierre, Jan. 21-22. Dir., Medical Licensure, Dr. J. F. D. Cook, Pierre.

TEXAS: Austin, Nov. 25-27. Sec., Dr. T. J. Crowe, 918-920 Mercantile Bldg., Dallas.

VERMONT: Burlington, Feb. 11. Sec., Dr. W. Scott Nay, Underhill.

VIRGINIA: Richmond, Dec. 4-6. Sec., Dr. J. W. Preston, 30½ Franklin Rd., Roanoke.

WASHINGTON: * Seattle, Jan. 13-15. Sec., Department of Licenses, Mr. Nelson N. Vaughan, Olympia.

WISCONSIN: * Madison, Jan. 14-17. Sec., Dr. H. W. Shutter, 425 E. Wisconsin Ave., Milwaukee.

* Basic Science Certificate required.

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

ARIZONA: Tucson, Dec. 17. Sec., Dr. Robert L. Nugent, University of Arizona, Science Hall, Tucson.

MICHIGAN: Ann Arbor, Detroit and East Lansing, Feb. 14-15. Sec., Miss Flora E. Dube, East Lansing.

OKLAHOMA: Oklahoma City, Nov. 18. Sec. of State, Hon. C. C. Childress, State Capitol, Oklahoma City.

RHODE ISLAND: Providence, Nov. 20. Acting Chief, Division of Examiners, Mr. E. Clyde Thomas, 366 State Office Bldg., Providence.

SOUTH DAKOTA: *Examination.* Yankton, Dec. 6-7. *Endorsement.* Dec. 21. Sec., Dr. Gregg M. Evans, Yankton.

WASHINGTON: Seattle, Jan. 9-10. Sec., Department of Licenses, Mr. Nelson N. Vaughan, Olympia.

WISCONSIN: Milwaukee, Dec. 7. Sec., Prof. Robert N. Bauer, 3414 W. Wisconsin Ave., Milwaukee.

Georgia June Report

Mr. R. C. Coleman, joint secretary, Georgia State Board of Medical Examiners, reports the written examination for medical licensure held at Atlanta, June 12-13, 1940. The examination covered ten subjects and included 100 questions. An average of 80 per cent was required to pass. Eighty-three candidates were examined, all of whom passed. The following schools were represented:

School	PASSED	Year Grad.	Per Cent
Emory University School of Medicine		(1940)	81.7, 82.3, 82.9, 83.3, 83.4, 83.5, 83.7, 84, 84.1, 84.4, 84.4, 84.6, 84.6, 84.7, 84.9, 85.2, 85.3, 85.4, 85.4, 85.5, 85.5, 85.9, 86, 86, 86, 86.2, 86.4, 86.4, 86.6, 86.7, 87, 87.2, 87.5, 87.5, 87.5, 87.5, 87.6, 87.8, 88.1, 89.4, 89.5, 90, 90.8, 91.5
University of Georgia School of Medicine		(1940)	80.4, 81.1, 81.4, 82.7, 82.8, 83.3, 83.4, 83.4, 83.6, 84.3, 84.4, 84.5, 84.5, 84.6, 84.7, 85, 85, 85.1, 85.1, 85.2, 85.3, 85.6, 85.7, 86, 86.4, 86.5, 87.1, 87.1, 87.8, 87.9, 88.3, 88.6
Northwestern University Medical School		(1940)	86.7
Rush Medical College		(1917)	81.3
Tulane University of Louisiana School of Medicine		(1940)	89.4
Harvard Medical School		(1940)	88.1
Cornell University Medical College		(1940)	86
New York University College of Medicine		(1940)	85.2
University of Pennsylvania School of Medicine		(1925)	83.2

Twenty-three physicians were successful in the practical examination for reciprocity and endorsement applicants on June 13 and July 12. The following schools were represented:

School	LICENSED BY RECIPROCITY	Year Grad.	Reciprocity with
George Washington University School of Medicine		(1938)	Dist. Colum.
Georgetown University School of Medicine		(1905)	Mississippi
Emory University School of Medicine		(1936), (1938)	N. Carolina
Rush Medical College		(1930)	Alabama
University of Kansas School of Medicine		(1934)	Kansas
University of Louisville School of Medicine		(1938)	Kentucky
Louisiana State University School of Medicine		(1939)	Louisiana
Tulane University of Louisiana School of Medicine		(1936), (1938)	Louisiana
Johns Hopkins University School of Medicine		(1934, 2)	Maryland
University of Maryland School of Medicine and College of Physicians and Surgeons		(1939)	N. Carolina
University of Minnesota Medical School		(1930)*	Minnesota
Medical College of the State of South Carolina		(1931)	S. Carolina
Meharry Medical College		(1935)	Tennessee
University of Nashville Medical Department		(1899)	Tennessee
University of Tennessee College of Medicine		(1929)	Tennessee
Baylor University College of Medicine		(1921)	Texas
Medical College of Virginia		(1927)	Virginia, (1931), (1935) North Carolina

School	LICENSED BY ENDORSEMENT	Year Grad.	Endorsement of
New York University College of Medicine		(1937)	N. B. M. Ex.

* License has not been issued.

Ohio Reciprocity Report

Dr. H. M. Platter, secretary, Ohio State Medical Board, reports thirty-four physicians licensed to practice medicine by reciprocity and three physicians so licensed by endorsement on July 2. The following schools were represented:

School	LICENSED BY RECIPROCITY	Year Grad.	Reciprocity with
University of Arkansas School of Medicine		(1938)	Arkansas
University of Colorado School of Medicine		(1925)	Colorado
The School of Medicine of the Division of the Biological Sciences		(1933)	Mass.
University of Illinois College of Medicine		(1937)	Illinois
Indiana University School of Medicine		(1939, 2)	Indiana
State University of Iowa College of Medicine		(1936)	Iowa
University of Kansas School of Medicine		(1936), (1939)	Kansas
University of Louisville School of Medicine		(1930), (1937), (1939)	Kentucky
University of Maryland School of Medicine and College of Physicians and Surgeons		(1935)	Penna.
Tufts College Medical School		(1937)	Mass.
University of Michigan Medical School		(1933), (1936)	Michigan
Wayne University College of Medicine		(1937), (1938)	Michigan
University of Minnesota Medical School		(1936)	Minnesota
St. Louis University School of Medicine		(1936), (1938), (1939, 2)	Missouri
Washington University School of Medicine		(1936), (1938)	Missouri
University of Nebraska College of Medicine		(1924), (1937)	Nebraska
Columbia University College of Physicians and Surgeons		(1937)	New York
Hahnemann Medical College and Hospital of Philadelphia		(1937)	Penna.
Meharry Medical College		(1939)	Tennessee
Vanderbilt University School of Medicine		(1937)	Tennessee
University of Virginia Department of Medicine		(1938)	Virginia
Marquette University School of Medicine		(1931)	Wisconsin
University of Toronto Faculty of Medicine		(1936)	Missouri

School	LICENSED BY ENDORSEMENT	Year Grad.	Endorsement of
Northwestern University Medical School		(1937)	N. B. M. Ex.
Harvard Medical School		(1938)	N. B. M. Ex.
Duke University School of Medicine		(1937)	N. B. M. Ex.

Book Notices

Applied Pharmacology. By Hugh Alister McGuigan, Ph.D., M.D., F.A.C.P., Professor of Pharmacology and Therapeutics, University of Illinois College of Medicine, Chicago. Cloth. Price, $9. Pp. 914, with 41 illustrations. St. Louis: C. V. Mosby Company, 1940.

There is need for additional textbooks in the field of pharmacology, and especially for textbooks that correlate clinical procedures with the data from the experimental laboratory; consequently this book will be received with more than ordinary interest. The attempt has been made to develop the subject in relation to physiology and biochemistry on the one hand and to its application to therapy on the other. The author has been successful in combining in a single book the two approaches which have been separately employed in other textbooks: the pharmacology of organs and systems is first presented from a functional point of view and this is followed by a section treating in detail the various drugs the action of which is associated most prominently with that system, including a treatment of its therapeutic applications. This is an ambitious program and it is perhaps inevitable that much had to be sacrificed in the attempt to squeeze into 900 pages subject matter of such broad scope: a difficulty inherent in any attempts to present a comprehensive description of pharmacology and its applications. Physiology is a large field and, while the subject is tersely summarized, this fact inevitably gives it a dogmatic character. Presumably the author's point of view is adequately represented, but the subject is one in which there is room for considerable diversity of opinion. Antiquated theories are given undue prominence and in many instances the material is not logically presented, nor is it free from errors.

The attempt to correlate the content of experimental pharmacology with its application to therapeutics is an even more difficult matter, and despite the aims set forth in the preface the author appears not to have carried this further than others have done in the standard textbooks of pharmacology. Few pharmacologists would agree with the introductory statement "While pharmacological knowledge is based largely on experiments made on laboratory animals, there is not the slightest reason for such study unless something is gained that can be carried over to aid in the treatment of a sick patient. Without clinical use in view, pharmacology becomes but a morbid curiosity." Without minimizing the importance of the applications of pharmacology, it can be confidently stated that its contributions give it a secure position among the pure sciences.

The content of pharmacology as usually taught in our medical schools is covered completely, and there are included chapters on the hormones, the vitamins and prescription writing. The newer drugs in general receive adequate treatment. There are, however, a few omissions, notably acetylcholine, which is only incidentally mentioned in connection with its functional role, and there is no discussion of its important derivatives. While for the reasons indicated this book will not find universal favor in connection with the requirements of medical school teaching, it has a fresh approach to various problems in pharmacology and will be read with interest and profit by many seeking to broaden their knowledge of pharmacology.

An Experiment in Responsible Learning: A Report to the Carnegie Foundation on Projects in Evaluation of Secondary School Progress 1929-1938. By William S. Learned, Staff Member, Carnegie Foundation for the Advancement of Teaching, and Anna L. Rose Hawkes, Staff Assistant for the Pennsylvania Inquiry. With a foreword by Walter A. Jessup, President of the Foundation. Study of the Relations of Secondary and Higher Education in Pennsylvania. Bulletin Number 31. Paper. Pp. 61. New York: Carnegie Foundation for the Advancement of Teaching, 1940.

A part of the foundation's study of the relations of secondary and higher education in Pennsylvania, this experiment had the purpose, in the words of President Jessup, "to discover and measure the durable intellectual capital of young students—those live resources they are sure of and able to use." The real job however, he declares, "is to make clear to the young person that genuine self education is not merely going through college—that it is both a simpler and a far more serious business. The school and college can help, but the student must first learn that he stands alone and that his education is within him."

In the course of its inquiry the foundation discovered that the essential features of its proposed investigation could be achieved only if the old credit structure was eliminated and in its place an entirely new educational program set up. Such a program, voluntarily adopted by three high schools, substituted for the customary "courses" and "credits" a procedure designed to keep the pupil constantly aware that the real object of education is (1) to understand as the result of knowledge and (2) to apply understanding effectively. Briefly, the experiment required that a selected teacher in any field, such as English, be given responsibility for directing all the English study of a certain group throughout a three year period and was empowered to formulate the entire program in his particular field. Grades having been discarded, emphasis was laid on the one factor essential for education, namely understanding and understanding how to use. Under this plan the role of the teacher is radically changed. Instead of repeating, each semester, the same courses to successive classes, the individual members of which he can never know well, he has an opportunity to observe his pupils, study their reactions and develop for each a long range program best adapted to evoke his active cooperation in the process of learning and to expand and mature his capabilities. Under such conditions how may the student's progress be measured? Could examinations be devised which would with reasonable accuracy test the amount of profitable thinking done, ideas mastered and working knowledge retained? Comprehensive examinations were available and, although designed for college use, proved fairly successful and surprisingly suggestive. The ultimate criterion of the success of the experiment was held to be the eventual performance of the pupil in college. The number participating may have been too small to justify sweeping conclusions as to the achievement of the group, but no one can doubt the significance of this attempt to bring home to the student of high school age a sense of responsibility for his own education.

Malaria and Colonization in the Carolina Low Country 1526-1696. By St. Julien Ravenel Childs, Department of History, Brooklyn College, Brooklyn. The Johns Hopkins University Studies in Historical and Political Science under the direction of the Departments of History, Political Economy, and Political Science, Series LVIII, Number 1. Paper. Price, $2.50. Pp. 292. Baltimore: Johns Hopkins Press, 1940

The author defines the Carolina Low Country as the coastal area extending from peninsular Florida to Cape Hatteras. As a whole this area is not particularly fertile and is poor in mineral wealth. It is in the limited areas suitable for agriculture that malaria is prevalent today and was so virulent in former times. Continuous occupation by people of European stock nowhere dates further back than 1670, when the English settled at Ashley River near the present site of Charleston.

The monograph is divided into seven chapters. The first is introductory and considers the natural history of the malarial parasite and the relation of malaria to colonization in general. Chapters 2 and 3 are devoted to the earlier colonies which failed but which have valuable implications in relation to malaria and the Ashley River settlement. After careful consideration of the various attempts of Ponce de Leon, de Ayllon, de Luna, Vallafañe, Ribaut and Laudonnière to establish colonies from 1526 to 1565, the author concludes that parasitic and infectious diseases were of importance only to the followers of de Ayllon and that even his attempt would not have succeeded in the absence of malaria. Similar consideration is given the various Spanish posts in Florida during the series of costly conquests between 1565 and 1580. The author reasons logically that the evidence indicates that European settlement of the Low Country was not necessarily attended by severe epidemics of malaria.

The major portion of the monograph, chapters 4-7, deals with the English colony at Ashley River. The specific topics considered are the peopling of Ashley River, 1670-1677, public health at Ashley River, 1670-1677, the promotion of immigration, 1678-1684, and the triumph and decline of malaria, 1682-1696. In drawing conclusions on the effect of malaria on this colony from its founding to 1696 the author considers in great detail the possible infection of immigrants, the virulence of the malarial parasite in localities from which the immigrants came, the presence and virulence of malarial infections in colonists and, finally, the probable effect of malaria on the history of the colony. He points out that the actual timing of some specific historical facts is unimportant. Thus the naturalization of

malaria would have followed shortly after the opening of the African trade even if it had not occurred between 1678 and 1696. The author stresses the inability of the malaria parasites to determine social history. He believes that such facts as the introduction of the malarious industry rice growing into a region already malarious reveals a surprising feebleness in the disease when pitted against man's economic desires. He does not believe that even the virulent Low Country malaria of the eighteenth century exercised a profound influence on society. Impotence to determine social patterns is implied by the similarity of malarious South Carolina and Jamaica to malaria-free Barbados. "Men being mortal, none save in fable and miracle has successfully denied that disease is mighty over the individual, but society being immortal, it is permissible to believe that parasites and viruses have played an unimportant role in social history. When the medicine man resumes the pose of prophet, it is well to recall that man's worst enemy has never been a bug."

The author is a historian and not a malariologist, but the references to the literature and the judgments regarding malaria indicate a wide acquaintance with the recent literature on the disease. All historical considerations of malaria leave much to be desired in the question of exact diagnosis. The present author has, contrasted with some earlier writers on the historical aspects of malaria, shown a healthy skepticism regarding many reports. In general one feels that his conclusions, although necessarily not based on decisive data, are probably sound. The book is an interesting and noteworthy contribution to the history of malaria. The bibliographic documentation is especially detailed.

Manual of Medical and Surgical Emergencies. Edited by J. C. Geiger, M.D., Director, Department of Public Health, City and County of San Francisco, California. Cloth. Price, $2.50. Pp. 199. San Francisco: J. W. Stacey, Inc., 1940.

More than fifty surgeons and physicians who are or who have been connected with the San Francisco Emergency Hospital have collaborated under Dr. Geiger's editorship in the preparation of this unusually valuable manual. The subject matter covers the wide range of conditions which may be encountered in an emergency hospital and includes all manner of surgical and medical emergencies. The manual will be an extremely practical and valuable guide to all who serve in emergency rooms. Detailed instructions are given, including the advice to apply to the completed bandage a stamp which reads "Consult your family doctor at once." The section on the care of fresh wounds is particularly good, but so are practically all the other sections. The commercial citrate flasks for blood transfusions should have been mentioned, and the consideration of vitamin deficiency, though excellent, could be omitted. Dr. Geiger is to be congratulated on his editorship of this authentic, time-saving manual.

Science and Everyday Life. By J. B. S. Haldane, F.R.S., Professor of Biometry in the University of London, London. Cloth. Price, $2. Pp. 284. New York: Macmillan Company, 1940.

This volume consists of a series of articles written by the author for various publications, mostly addressed to the public. They appeared in England in the *Daily Worker* as a series of columns. The articles are divided into eleven chapters dealing with food, bad air, general science, drugs, heredity and social-medical relationships. Dr. Haldane writes beautifully and he is intelligible to every intelligent reader. He seems still to be seriously impressed by the Russian experiment. Presumably the *Daily Worker* in Great Britain is a facsimile of the one which has been inflicted on Americans in recent years. Dr. Haldane admits frankly his belief in the doctrines of Marx and it is interesting to see how even medical science can become unscientific when one wishes to promote a doctrine rather than scientific fact. Professor Haldane is himself a thinker and, of course, makes every reader think. His comment on the case of elixir of sulfanilamide is amusing. He says "The company said they did not know ethylene glycol was a poison. So, as the stuff had been sold in the sacred cause of profit, no one was electrocuted or even imprisoned. The gangsters must have felt very sore about it, considering the fuss made when one of them bumps off even half a dozen people." Especially significant is his chapter on racial doctrines and his outline of the organization of British science.

Pathogenic Anaerobic Organisms of the Actinomyces Group. By Dagny Erikson. Medical Research Council Special Report Series, No. 240. Paper. Price, 1s. Pp. 63, with illustrations. London: His Majesty's Stationery Office, 1940.

In 1935 a report (No. 203) was issued of Miss Erikson's study of aerobic types of Actinomyces. The present report deals with results of her study of anaerobic organisms of that group. The study covers twenty anaerobic or micro-aerophilic Actinomyces strains, fifteen being of human and five of bovine origin. The bovine strains (Actinomyces bovis) were found to be essentially identical and different from the human strains, which also form one group with only minor variations. Miss Erikson's human type corresponds to the original Wolff-Israel type (Actinomyces israeli) and to the majority of reported strains of human origin. The report will be of much value to future workers on the etiology of actinomycotic diseases. It is important that new cultures of Actinomyces be submitted to some permanent collection for identification and preservation for further study.

The Bacteriology of Public Health. By George M. Cameron, Ph.D., Associate Professor of Bacteriology, University of Tennessee, Memphis. Cloth. Price, $3.50. Pp. 451, with 43 illustrations. St. Louis: C. V. Mosby Company, 1940.

This textbook is elementary and deals principally with pathogenic bacteria. The term "ptomaine," which has been discarded as meaningless by the chemist and students of food poisoning, is still used in this book. The author refers to it in chapter 2, on the development of knowledge, in chapter 3, on the sources of the microbial flora of the alimentary canal, and in chapter 6, on food idiosyncrasies, food poisoning and food infections. The author is unorthodox in his evaluation of antiseptics for the mouth and of x-ray examination in determining the activity of tuberculous lesions. In chapter 3, under his discussion of micro-organisms in the mouth, he states that "the importance of clean teeth and the use of good antiseptics in the mouth cannot be overemphasized." In chapter 15, on tuberculosis, he states that "x-ray pictures are important in determining the extent of tuberculous lesions in the patient, but they give no information as to the activity of such cases." The book might appeal to the layman, but it cannot be recommended to the medical profession.

La fotografia del estomago. Por José P. Uslenghi, Herbert Hofmann y Joseph Heilpern. Paper. Pp. 215, with 275 illustrations. Buenos Aires: Aniceto Lopez, 1939.

This is a revised edition of the book of Herbert Hofmann which appeared in 1936 and was reviewed in THE JOURNAL Sept. 12, 1936, page 903. Although the size of the volume has been increased considerably, the only important difference is the addition of a plate with a colored gastrophotograph made through the Heilpern gastrophotor. If one opens a new volume on gastrophotography one always hopes to find a report of definite progress; but, again, no such progress can be noted. Only a few of the photographs of the interior of the stomach show some similarity to corresponding gastroscopic pictures or to photographs made through the gastroscope (figs. 146, 148, 154 and 253). All the other illustrations are full of artefacts and their interpretation is inadequate. This disappointing volume merely demonstrates of what little use the method of blind gastrophotography is at the present time.

Sulfanilamide, Sulfapyridine and Allied Compounds in Infections. By Maurice A. Schnitker, M.D., Associate Attending Physician, Toledo Hospital, Toledo. Edited by Henry A. Christian, A.M., M.D., LL.D. [Reprinted from Oxford Loose-Leaf Medicine.] Cloth. Price, $1.50. Pp. 72. New York, Toronto & London: Oxford University Press, 1940.

In the foreword of this book it is stated that the physician needs a book to turn to to find authoritative statements about the therapeutic utility of the sulfonamides which will aid him as a guide in the use of these preparations. This purpose, unfortunately, is not satisfactorily accomplished. A brief introductory section on the pharmacology of sulfanilamide is not well organized, is quite superficial and devotes a fourth of its content to the relatively unimportant question of the excretion of sulfanilamide in the breast milk of lactating women. The paragraphs on methods of administration and dosage are unnecessarily cumbersome and confusing. The stated indications for the use of large, moderate and small doses would in practice need to be modified frequently and sometimes are contradicted elsewhere in the text. For example, puerperal

sepsis is included among the conditions requiring only moderate doses, while in a later paragraph dealing with the treatment of this condition it is suggested that the best results may be obtained by maintaining steadily a blood concentration of from 10 to 15 mg. per hundred cubic centimeters. Similarly the section dealing with infections in which sulfanilamide is effective often suffers because of apparent contradictions; e. g., in discussing the treatment of infections of the urinary tract the author speaks of "the probability that the concentration in the blood stream is more important in overcoming the infection than is the concentration in the urine" only to follow this in a subsequent paragraph with the suggestion "that with a given organism a certain level of free sulfanilamide must be maintained in the urine in order to obtain the best results." The statement that combined serum and sulfanilamide should be used in meningococcic meningitis is not in agreement with most current opinion nor does it seem profitable to describe the use of sulfanilamide in pneumococcic pneumonia immediately following the statement that sulfapyridine has supplanted sulfanilamide in the treatment of this disease. The section on the toxic manifestations of sulfonamide therapy is fairly comprehensive but the text is lacking in clarity and, like the book as a whole, leaves the reader more confused than instructed.

Dermatology and Syphilology for Nurses Including Social Hygiene. By John H. Stokes, M.D., Professor of Dermatology and Syphilology, the School of Medicine, University of Pennsylvania, Philadelphia. Third edition. Cloth. Price, $2.75. Pp. 365, with 74 illustrations. Philadelphia & London: W. B. Saunders Company, 1940.

In this edition the author has given the text a careful revision and included the most recent additions to dermatotherapy. The section on venereal diseases has been increased in scope. Fever therapy and sulfanilamide treatment in various diseases are fully covered. This book remains the standard textbook for nurses in the field of dermatology and syphilology.

Bureau of Legal Medicine and Legislation

MEDICOLEGAL ABSTRACTS

Privileged Communications: Privilege Applicable Only to Judicial Proceedings—Not to Legislative Investigations.—The City Council of the City of New York appointed a committee to inquire into charges of negligence and malpractice in the treatment of patients at a certain city hospital. Subpoenas duces tecum were served on the Commissioner of Hospitals of New York City and on the medical superintendent of the hospital involved, each of whom appeared before the committee but refused to "produce any papers or documents relating to complaints made by any one with respect to any of the internes, clinic physicians or visiting staff . . . or with respect to medical or other treatment or service furnished in the wards or clinics of the hospital containing data relating to the condition of the patients or to the medical or other treatment or service furnished to them." They based their refusal on section 352 of the Civil Practice Act of New York, which provides, in part, as follows:

> "a person duly authorized to practice physic or surgery, or a professional or registered nurse, shall not be allowed to disclose any information which he acquired in attending a patient in a professional capacity, and which was necessary to enable him to act in that capacity.

The committee then instituted appropriate proceedings before the supreme court, special term, New York county, to require the commissioner and the medical superintendent to produce the books and records called for by the subpoenas or be punished for contempt of court.

The sole question to be determined concerned the right of the two defendants, by virtue of the privileged communications statute quoted, to refuse to produce the hospital records. At common law, said the supreme court, information acquired by physicians or nurses in the treatment of patients was not privileged and a disclosure of both the patient's condition and the treatment given him could be compelled. Only to the extent that the situation existing at common law has been changed by statute are communications between physician and patient now privileged. The only statute which purports to create such a privilege is section 352 quoted above. That section, however, it has been held, applies only to judicial proceedings and does not create a privilege for all purposes and under all conditions. As was said by the Court of Appeals of New York in *Buffalo Loan, Trust & Safe-Deposit Co.* v. *Knights Templar & Masonic Mut. Aid Ass'n,* 126 N. Y. 450, 27 N. E. 942, 22 Am. St. Rep. 839:

> *The primary purpose of the section was to declare the rule governing the examination of a physician as a witness in judicial proceedings* . . . [Section 354 of the Civil Practice Act declares that the section creating the privilege with respect to clergymen, physicians, and attorneys applies] to every examination of a person as a witness, unless the provisions thereof are expressly waived by a person confessing the patient or the client. The disclosure by a physician of information acquired in his professional character in attending a patient, where not made in the course of his professional duty, is a plain violation of professional propriety. But the statute does not prescribe a rule of professional conduct for the government of physicians in their general intercourse with society. The common law did not protect a physician from disclosing as a witness information acquired professionally from patients. . . . The statute was intended to afford this protection, and to protect the patient also. If a physician, disregarding the plain obligations of his situation, should in conversation disclose the secrets of his patient, he would, so far as we know, violate no statute, however reprehensible his conduct would be. The statute should have a broad and liberal construction, to carry out its policy. By reasonable construction it excludes a physician from giving testimony *in a judicial proceeding* in any form, whether by affidavit or on oral examination, involving a disclosure of confidential information acquired in attending a patient, unless the seal of secrecy is removed by the patient himself.

Confirmation of the fact that the privileged communication statute, continued the supreme court, was intended to apply only to judicial proceedings is to be found in the fact that the only provision permitting a waiver of the privilege states that the waiver "must be made in open court, on the trial of the action or proceeding, and a paper executed by a party prior to the trial providing for such waiver shall be insufficient as such a waiver." (Civil Practice Act, Section 354.)

This court, continued the supreme court, accordingly holds that the privilege in question does not apply to legislative investigations. To uphold the claim of privilege would make it impossible for the city's legislative body to examine into the serious charges made with respect to the administration of the hospital in question. Incompetence and malpractice, with great harm and danger to the public, might thus be permitted to continue while the city's legislative body remained powerless to ascertain the facts and take appropriate action. There is not the slightest evidence that the legislature in enacting the privileged communication statute ever intended to extend its scope so as to produce such a situation. If the hospital authorities are permitted access to the confidential data relating to the treatment of patients, there appears to be no good reason for withholding them from the city council, which, in effect, is the legal superior of the hospital authorities.

Accordingly, the court directed the defendants to produce all the books and records which they had declined to produce and directed further that, in the event of their failure to obey, a warrant for their commitment to jail be issued.—*In re Lincoln Hospital, Bronx (N. Y.), 20 N. Y. S. (2d) 712.*

Right of Osteopaths to Prescribe and Dispense Narcotics in Georgia.—The Georgia Association of Osteopathic Physicians & Surgeons, Incorporated, and certain osteopaths brought an action in the District Court of the United States for the middle district of Georgia to restrain the Collector of Internal Revenue of the United States in the State of Georgia from refusing to permit osteopaths licensed to practice in Georgia to register under the Harrison Narcotic Act. The trial court entered a judgment for the collector (31 F. Supp. 206) and the plaintiffs appealed to the United States circuit court of appeals, fifth circuit.

A collector of internal revenue, said the circuit court of appeals, has no discretion in permitting or refusing to permit an applicant to register under the Harrison Narcotic Act. If under the laws of the state in which the applicant is licensed

to practice the healing art he is authorized to use narcotic drugs in connection with his practice, the collector must permit him to register; if those laws do not authorize the applicant to use narcotic drugs, the collector cannot permit the applicant to register. The determining question then is whether or not under the laws of Georgia a person licensed to practice osteopathy in Georgia has the right to use narcotic drugs in connection with his practice.

Two laws regulating the possession and distribution of narcotic drugs are apparently in force in Georgia. One of those laws (Georgia Code Ann., Sec. 42-704), enacted in 1907, forbids the sale of narcotics, except on the written order or prescription of a lawfully authorized practitioner of medicine, dentistry or veterinary medicine. Another law (Georgia Code Ann., Sec. 42-802 et seq.), enacted in 1935, provides that narcotic drugs can be sold to a physician, dentist or veterinarian, or by an apothecary on a written prescription of a physician, dentist or veterinarian. The latter law defines a physician to be a person authorized by law to practice medicine in the state, and any other person authorized by law to treat sick and injured human beings in Georgia and to use narcotic drugs in connection with such treatment. The plaintiffs contended that they are "practitioners of medicine" within the meaning of the 1907 law and "physicians" within the meaning of the 1935 law, and that under either classification they are entitled to prescribe and administer narcotic drugs in connection with their practice. They cited the fact that osteopaths had always been registered and licensed to dispense drugs in Georgia prior to the acts which gave rise to the instant suit. They further argued that their licenses authorize the practice of osteopathy "as taught and practiced in the legally incorporated and reputable colleges of osteopathy" (Georgia Code Ann., Sec. 84-1209, enacted in 1909), and that the use of narcotic drugs and other drugs is an integral and essential part of their professional work as so taught and practiced. But, answered the circuit court of appeals, the controlling Georgia statutes do not expressly include osteopaths among those legally empowered to dispense and administer narcotic drugs. We think it is clear that the Georgia legislature did not intend to authorize osteopaths to use narcotic drugs in their practice.

Webster's New International Dictionary, continued the court, defines osteopathy to be a system of treatment based on the theory that diseases are chiefly due to deranged mechanism of the bones, nerves, blood vessels and other tissues and can be remedied by manipulation of these parts. In enacting the Georgia osteopathic practice act and the various amendments thereto the Georgia legislature has repeatedly classified osteopathy as "a non-drug-giving school of medical practice" (Georgia Acts of 1916, Sections 84-9918, 84-9919; Georgia Code Ann., Sec. 84-906). In *Bennett* v. *Ware*, 4 Ga. App. 293, 61 S. E. 546, the court of appeals of Georgia in 1908 interpreted the phrase "practice of medicine," as used in the narcotic drug act enacted in 1907, to mean prescribing or administering drugs or medicinal substances, or as relating to those means and methods of treatment for prevention of disease taught in medical colleges and practiced by medical practitioners. The court in that case classified osteopaths as being among those who "eschew the practice of medicine altogether." One year later, in 1909, the Georgia legislature first officially recognized the practice of osteopathy by providing for the licensing of osteopaths. It is apparent, therefore, that an osteopath was not a physician or practitioner of medicine within the general acceptation of that term, or within the contemplation of the Georgia legislature, when the statutes in question were enacted. Furthermore, it conclusively appears that the accepted meaning of the term "osteopathy," from the beginning of the school of osteopathy in 1874 and far beyond 1909, the year in which the osteopathic practice act was enacted and the date which is controlling in this case, contemplated a drugless school of medicine. In fact, an examination of the history of the osteopathic school indicates that osteopathy is the very antithesis of any science of medicine involving the use of drugs.

The court concluded, therefore, that a licensed osteopath is not authorized under the laws of Georgia to use narcotic drugs in connection with his practice. Accordingly, the court held that the action of the trial court in dismissing the suit to require the collector to permit osteopaths to register under the Harrison Narcotic Act was proper, and so it affirmed the trial court's judgment of dismissal.—*Georgia Ass'n of Osteopathic Physicians & Surgeons, Inc., et al. v. Allen, Collector of Internal Revenue, 112 F. (2d) 52.*

Compensation of Physicians: "Expenses of the last illness" Construed.—The General Code of Ohio, section 10509-121, requires an executor or administrator to pay, out of the estate, the debts of a deceased in the following order:

1. Bill of funeral director not exceeding three hundred fifty dollars, such other funeral expenses as are approved by the court, the expenses of the last sickness and those of administration.

The plaintiff physician began to treat the deceased for cancer on March 1, 1935. The treatments administered by him were at irregular intervals, there being no treatments rendered from Aug. 12, 1935, to July 6, 1936, and periods during which the deceased was regularly employed were interspersed. He continued to treat the deceased until Nov. 14, 1936, after which time she was treated at her home by another physician, apparently for the reason that the plaintiff gave treatments for cancer only in his office or at a hospital. The deceased died as the result of the cancer on March 27, 1937. The administratrix of the deceased's estate refused to recognize the plaintiff's bill for his services as a preferred indebtedness of the deceased. The plaintiff then filed exceptions in the probate court, which exceptions were upheld. From a judgment of the court of common pleas affirming the judgment of the probate court and holding that the plaintiff's claim was an expense of the deceased's last sickness and therefore a preferred indebtedness, the administratrix appealed to the court of appeals of Ohio, Lucas County.

The court of appeals held that the plaintiff's bill for the medical services rendered by him to the deceased could not be considered an expense of the deceased's last sickness. If it were such an expense then any treatment of an incurable disease, no matter how long before the death of the patient the treatment was given, could be construed as an expense of the last illness of the deceased. In so holding the court relied indirectly on the case of *Proto, Adm'r,* v. *Chenoweth,* 40 Ariz. 312, 11 P. (2d) 950, in which the Supreme Court of Arizona in construing a similar claim said:

It seems to us that the reasonable meaning of the phrase precludes, or should preclude, a physician from making claim to a preference, even though his treatment was for the same disease of which the patient finally died, if and when his services are not continuous, but occasional, with long intervals of discontinuance unexplained, and especially when the patient at the time of his death has severed the relation and employed another to look after him.

Accordingly, the court of appeals reversed the judgment in favor of the plaintiff and disallowed his claim to preferment.—*Murphy v. Langa (Ohio), 23 N. E. (2d) 516.*

Society Proceedings

COMING MEETINGS

American Academy of Pediatrics, Memphis, Tenn., Nov. 18-20. Dr. Clifford G. Grulee, 636 Church Street, Evanston, Ill., Secretary.

American Society of Anesthetists, New York, Dec. 12. Dr. Paul M. Wood, 745 Fifth Ave., New York, Secretary.

American Society of Tropical Medicine, Louisville, Ky., Nov. 12-15. Dr. E. Harold Hinman, Malaria Control Division, Wilson Dam, Ala., Secretary.

American Student Health Association, Ann Arbor, Mich., Dec. 27-28. Dr. Ralph I. Canuetson, University of Kansas, Lawrence, Kan., Secretary.

Puerto Rico, Medical Association of, San Juan, Dec. 13-15. Dr. David E. Garcia, P. O. Box 3866, Santurce, Secretary.

Radiological Society of North America, Cleveland, Dec. 2-6. Dr. Donald S. Childs, 607 Medical Arts Bldg., Syracuse, N. Y., Secretary.

Society of American Bacteriologists, St. Louis, Dec. 27-29. Dr. I. L. Baldwin, Agricultural Hall, University of Wisconsin, Madison, Wis., Secretary.

Southern Medical Association, Louisville, Ky., Nov. 12-15. Mr. C. P. Loranz, Empire Bldg., Birmingham, Ala., Secretary.

Southern Surgical Association, Hot Springs, Va., Dec. 10-12. Dr. E. Alton Ochsner, 1430 Tulane Ave., New Orleans, Secretary.

Southwestern Medical Association, Tucson, Ariz., Nov. 21-23. Dr. M. P. Spearman, 1001 First National Bank Bldg., El Paso, Texas, Secretary.

Western Surgical Association, Topeka, Kan., Dec. 6-7. Dr. Albert H. Montgomery, 122 South Michigan Blvd., Chicago, Secretary.

Current Medical Literature

AMERICAN

The Association library lends periodicals to members of the Association and to individual subscribers in continental United States and Canada for a period of three days. Three journals may be borrowed at a time. Periodicals are available from 1930 to date. Requests for issues of earlier date cannot be filled. Requests should be accompanied by stamps to cover postage (6 cents if one and 18 cents if three periodicals are requested). Periodicals published by the American Medical Association are not available for lending but can be supplied on purchase order. Reprints as a rule are the property of authors and can be obtained for permanent possession only from them.

Titles marked with an asterisk (*) are abstracted below.

American Journal of Clinical Pathology, Baltimore

10:593-672 (Sept.) 1940

*Positive Friedman Tests in Nonpregnant States. E. P. McCullagh and W. K. Cuyler, Cleveland.—p. 593.

Carbon Monoxide Content of Blood Under Various Conditions. A. O. Gettler and H. C. Freimuth, New York.—p. 603.

*Analysis of Hippuric Acid, Galactose Tolerance, Bromsulphalein and Prothrombin Tests in 381 Cases. C. J. DeLor and H. L. Reinhart, Columbus, Ohio.—p. 617.

Rare Forms of Primary Malignant Lung Tumors: Report of Three Types. A. R. Casilli, Elizabeth, N. J., and H. J. White, Metuchen, N. J.—p. 623.

Diagnostic Significance of Eosinophilia in Periarteritis Nodosa. J. Lebowich and H. D. Hunt, Saratoga Springs, N. Y.—p. 642.

Actinomycosis: Review of Subject with Detailed Clinical and Autopsy Reports of One Case Each of Intestinal and Ovarian Forms. L. S. Auster, New York.—p. 652.

Positive Friedman Tests in Nonpregnant States.—McCullagh and Cuyler emphasize the fact that a variety of conditions other than pregnancy may be associated with the excretion of sufficient gonadotropic substance to produce a positive Friedman reaction. They obtained 241 positive Friedman tests in 2,134 cases in which neither pregnancy nor evidence of chorionic tissue was present. Of 1,774 tests in women 172 yielded positive reactions, and of 360 tests in men sixty-nine yielded positive reactions. The authors emphasize that in considering the positive reactions in these cases it should be remembered that all tests were done on persons suspected not of pregnancy but of some endocrine abnormality, and the frequency of positive results is thus not comparable to the so-called false positives found in cases in which the test was done for suspected pregnancy. They do not want to imply that this test is not of extremely high value in the diagnosis of pregnancy but rather to point out that, when used as it has been here, its value may be extended and, in addition, positive reactions which may in the past have been misleading may be better anticipated and more accurately interpreted. The test is made on adult female rabbits. The patient is instructed to restrict the fluid intake after 4 o'clock in the afternoon to one glass of water at the evening meal and none thereafter until the rising specimen of urine is collected, which is used for the test. Four cc. of urine is injected into the ear vein of the rabbit on each of three occasions daily for two successive days and the abdomen is opened under ether anesthesia on the morning of the third day. The following observations are considered to constitute a positive reaction: (1) freshly ruptured graafian follicles, (2) hemorrhagic follicles or (3) fresh corpora lutea. For purposes of analysis the authors divide cases showing positive Friedman reactions into several groups: conditions associated with disorders peculiar to women, conditions associated with or due to testicular deficiency or tumor, endocrine disorders that are not sex specific, disorders of the nervous system and of the pituitary and conditions not clearly endocrine in nature. They emphasize that the test is frequently positive about the time of puberty, possibly for physiologic reasons. It may be positive in psychoses, hysteria, epilepsy and arterial hypertension in the absence of gonadal failure and may be useful in the differential diagnosis of pituitary cachexia and anorexia nervosa. Primary disease of the pituitary such as acromegaly or pituitary tumor and also organic lesions in the hypothalamus may cause positive reactions. In cases of dwarfism and in some cases of obesity, such as are usually designated Fröhlich's syndrome, positive reactions have occurred suggesting that the gonadal failure present could not be due to deficiency of gonadotropic hormone production and must be secondary to other causes. Positive tests may be present in hyperthyroidism, diabetes mellitus and adrenal cortex hyperfunction either of the functional type or in cases of adrenal cortex tumor. Gonadal damage in either sex may cause a positive test; thus positive reactions are frequent at the menopause and in women with functional ovarian deficiency, ovarian tumors or inflammation. Positive reactions are also seen in men with testicular deficiency, cryptorchism and prostatic hypertrophy. Positive tests have been found also in alopecia areata and in cases of progressive myopia and keratoconus.

Analysis of Tests of Hepatic Function.—DeLor and Reinhart state that, following the publication of Quick's hippuric acid liver function test in 1933, they began its use as a routine examination in suspected liver disease along with the galactose tolerance test and the bromsulphalein test, and more recently they added the determination of the blood prothrombin. These tests were instituted as a preoperative routine in various types of gallbladder disease because of the frequently associated liver disease. Selected liver function tests were also conducted in a group of other diseases, but only in those cases in which there was reason to suspect impairment of liver function. Early in the course of the investigations it became apparent that severe grades of liver damage may be recognized by any of the tests, irrespective of the inherent sensitivity of the test. But, in cases in which liver function was moderately or slightly impaired, few of the tests indicated any evidence of functional impairment. In general it may be said that some evidence of impaired liver function may be obtained in hepatitis, cholecystitis, hyperthyroidism, severe burns, intoxications (drugs, anesthetics, poisons), general acute infections, traumatic injuries of the abdomen with general acute infections, traumatic injuries of the abdomen with contusion of the liver, malignant growths both primary and metastatic, leukemias with hepatic infiltration, some types of anemia, and in debilitating, emaciating diseases, with some or all of the tests used in this series. The authors present the results of the various tests in a table. Their experiences with 381 cases convinced them that normal liver function tests do not exclude the presence of hepatic disease. The hippuric acid, bromsulphalein, serum, bilirubin, blood prothrombin and total blood cholesterol roughly parallel one another as liver function is diminished. The galactose tolerance test is the least reliable test in this study. The bromsulphalein is the most sensitive test for the identification of early liver damage. If two or more of the liver function tests are low, the mortality and morbidity percentage is greater, and as yet no single liver function test furnishes as reliable a prognosis as that which may be derived from two or more tests. The mortality mounts rapidly in cases with 50 per cent or more diminution of liver function as estimated by the foregoing methods.

American Journal of Public Health, New York

30:1023-1158 (Sept.) 1940

An "American" Health Program. D. B. Armstrong, New York, and W. P. Shepard, San Francisco.—p. 1023.

Criteria for Evaluation of Printed Matter. P. S. Broughton, New York.—p. 1027.

Brilliant Green Lactose Bile and Standard Methods Completed Test in Isolation of Coliform Organisms: Comparative Study. C. B. Kelly, Freeport, N. Y.—p. 1034.

Influence of Organic Acids, Sugars and Sodium Chloride on Strains of Food Poisoning Staphylococci. T. D. Nunheimer and F. W. Fabian, East Lansing, Mich.—p. 1040.

Observations on Durability of Mottled Teeth. Margaret Cammack Smith and H. V. Smith, Tucson, Ariz.—p. 1050.

Personnel Administration Under Civil Service. G. T. Palmer, New York.—p. 1053.

Coliform Bacteria and Streptococci in Swimming Pool Water. R. L. France and J. E. Fuller, Amherst, Mass.—p. 1059.

Vapors and Their Routine Measurement. P. Drinker, Boston.—p. 1063.

Effects of Vitamin C Intake on Degree of Tooth Injury Produced by Diphtheria Toxin. C. G. King, R. R. Musulin and W. F. Swanson, Pittsburgh.—p. 1068.

Utilization of Available Resources in Control of Tuberculosis. W. C. Williams, Nashville, Tenn.—p. 1073.

Longevity of Eberthella Typhosus in Various Soils. P. J. Beard, Stanford University, Calif.—p. 1077.

Wilson Method for Bacteriologic Examination of Water. R. Ferramola, Buenos Aires, Argentina.—p. 1083.

Health Education Through the Ages. O. Temkin, Baltimore.—p. 1091.

Programs for Public Health Nurses in Birth Control Work: Outline Developed in North Carolina State Board of Health for Staff Education. Frances R. Pratt, Raleigh, N. C.—p. 1096.

Archives of Neurology and Psychiatry, Chicago

44:701-928 (Oct.) 1940

Experimental Studies on Headache: Further Analysis of Histamine Headache and Its Pain Pathways. G. A. Schumacher, B. S. Ray and H. G. Wolff, New York.—p. 701.
Human Pyramidal Tract: II. Numerical Investigation of Betz Cells of Motor Area. A. M. Lassek, Charleston, S. C.—p. 718.
Changes in Nervous System Following Carbon Disulfide Poisoning in Animals and in Man. B. J. Alpers and F. H. Lewy, Philadelphia.—p. 725.
Surgical Division of Commissural Pathways in Corpus Callosum: Relation to Spread of Epileptic Attack. W. P. Van Wagenen, Rochester, N. Y., and R. Y. Herren, Portland, Ore.—p. 740.
Faradic Shock in Treatment of Functional Mental Disorders: Treatment by Excitation Followed by Intravenous Use of Barbiturates. N. J. Berkwitz, Minneapolis.—p. 760.
Connections of the Red Nucleus. J. W. Papez and W. A. Stotler, Ithaca, N. Y.—p. 776.
"Spinal Dysraphism": Spina Bifida and Myelodysplasia. B. W. Lichtenstein, Chicago.—p. 792.
Advantages and Danger of Combined Anoxic and Insulin Shock: Report of Animal Experiments with Possible Method of Treatment for Schizophrenia. J. Tannenberg, Bedford Hills, N. Y.—p. 811.
Behavior of Electrolytes in Familial Periodic Paralysis. J. W. Ferrebee, Mildred K. Gerity, Dana W. Atchley and R. F. Loeb, New York.—p. 830.
Familial Paroxysmal Choreo-Athetosis: Preliminary Report on a Hitherto Undescribed Clinical Syndrome. L. A. Mount and S. Reback, New York.—p. 841.
Chronic Encephalitis: Pathologic Report of Case with Protracted Somnolence. R. B. Richter and E. F. Traut, Chicago.—p. 848.
Diabetes Insipidus. T. H. McGavack, J. W. Benjamin and S. Liebowitz, New York.—p. 867.
Resorption of Intracranial Gumma Under Electro-Encephalographic Control. Margaret Rheinberger and J. Siris, New York.—p. 879.

Canadian Medical Association Journal, Montreal

43:201-304 (Sept.) 1940

Shock: Its Cause and Treatment. J. C. Meakins, Montreal.—p. 201.
Studies in Experimental Shock. C. H. Best and D. Y. Solandt, Toronto.—p. 206.
Soldier's Documents: Their Value to the Soldier for Possible Pension. W. C. Arnold, Ottawa, Ont.—p. 210.
*Routine Chest X-Ray Examination of Recruits: Survey of Results. W. A. Jones, Ottawa, Ont.—p. 213.
Etiology and Modern Treatment of Varicose Ulcer. J. C. Luke, Montreal.—p. 217.
Pneumocystogram. R. W. Boyd, Calgary, Alta.—p. 221.
Bronchomoniliasis in Saskatchewan. D. M. Baltzan, Saskatoon, Sask.—p. 224.
Pancreatic Lithiasis. S. R. Townsend, Montreal.—p. 228.
Combined Surgical and Fluoroscopic Method of Inserting the Smith-Petersen Nail. G. H. Ryan and D. Wheeler, Winnipeg, Man.—p. 231.
Oral Desensitization in Food Allergy. H. E. Edwards, Toronto.—p. 234.
Therapy of Peptic Ulcer. W. Goldie, Toronto.—p. 236.
Ophthalmoplegic Migraine: Report of Case. A. J. Elliot, New York.—p. 242.
Management of Infections of Kidney and Bladder. A. M. Crance, Geneva, N. Y.—p. 244.
Newer Drugs in Treatment of Epilepsy. J. N. Petersen and H. M. Keith, Montreal.—p. 248.
High Spinal Anesthesia. R. J. Fraser, Hamilton, Ont.—p. 251.
Pellagra: Report of Case. A. T. Gillespie, Fort William, Ont.—p. 255.
Ragweed Situation in Eastern Canada in Relation to Hay Fever. H. Groh and W. H. Minshall, Ottawa, Ont.—p. 258.
Spinal Appendicitis. C. B. Rich, Edmonton, Alta.—p. 260.
Oil of Wintergreen Poisoning: Report of Two Additional Fatal Cases. W. T. Shirreff and L. N. Pearlman, Ottawa, Ont.—p. 264.

Routine Chest X-Ray Examination of Recruits.—Jones states that the survey begun Nov. 6, 1939, and ended at the end of April 1940 for the discovery of concealed thoracic disease among recruits otherwise considered fit for service disclosed that a little more than 1.5 per cent were not fit. Of several thousand examined about 1 per cent were rejected because of present or past pulmonary tuberculosis, and slightly more than 0.5 per cent because of other respiratory and circulatory diseases, while about 0.1 per cent were refused for miscellaneous conditions, such as substernal thyroid, tuberculosis of the spine and marked scoliosis, missed at the physical examination. There were seventeen cases of silicosis, one from a district not known to have this disease, but further investigation, prompted by this discovery, resulted in the finding of six more instances among the man's fellow workers. The survey has disclosed 240 cases of tuberculosis among enlisted troops and probably as many more among candidates for enlistment. The study likewise resulted in the rejection of 0.22 per cent with other types of respiratory disorders and of 0.294 per cent of all applicants because of the abnormal size or shape of the heart. The outline of a tuberculous abscess along the thoracic spine or the demonstration of a tumor or marked scoliosis accounted for 0.093 per cent more rejections. The survey is worth while because it protects other service men from tuberculous infection and as a means of preventing the unfit from entering the service. It is sound economically because its cost is relatively low and because of the potential saving of enormous treatment and pension costs. Concurrently, the survey is an important civilian public health project. To make it more effective those medical officers on whom devolves the personal care of sailors, soldiers and airmen should always be on the alert for early symptoms of tuberculosis, and the fullest use of x-ray facilities should be made in all chest cases or possible chest cases.

Canadian Public Health Journal, Toronto

31:407-456 (Sept.) 1940

Prevention of Streptococcic Infection of Wounds. R. Hare, Toronto.—p. 407.
The Whence and Whither of Milk Sanitation. R. S. Breed, Geneva, N. Y.—p. 414.
Rabies Infection. A. E. Cameron, Ottawa, Ont.—p. 424.
Observations on Nutritive Value of Bread. E. W. McHenry, Toronto.—p. 428.
Two Phage-Susceptible Types of Bacillus Typhosus Isolated from Typhoid Fever Case. Dorothy E. Helmer, Donna E. Kerr, C. E. Dolman and L. E. Ranta, Toronto.—p. 433.

Journal of Immunology, Baltimore

39:171-264 (Sept.) 1940

Studies of Early Stage of Resistance to Pneumococcic Infection: I. Relation to Early Hypersensitive Response of the Tissues. Josephine McBroom and Helen Schlesinger, Pittsburgh.—p. 171.
Id.: II. Type Specificity and Humoral Immune Body Production. Helen Schlesinger and Josephine McBroom, Pittsburgh.—p. 185.
Detectability of Pneumococcic Capsular Polysaccharide and Antibody in Blood, Broth and Saline Solution (Optimal Concentration of Antigen and Antibody). S. C. Bukantz and P. F. de Gara, New York.—p. 195.
Elimination of Horse Serum Specificity from Antitoxins. R. D. Coghill, N. Fell, Martha Creighton and G. Brown, Detroit.—p. 207.
Physical-Chemical Study of Normal and Immune Horse Serums. N. Fell, K. G. Stern and R. D. Coghill.—p. 223.
Complement Fixation in Human Malaria: I. Results Obtained with Various Antigens. Anna Dean Dulaney and W. K. Stratman-Thomas, Memphis, Tenn.—p. 247.
Id.: II. Diagnostic Application. W. K. Stratman-Thomas and Anna Dean Dulaney, Memphis, Tenn.—p. 257.

Kansas Medical Society Journal, Topeka

41:365-408 (Sept.) 1940

Role of Endocrines in Pediatric Practice. J. D. Boyd, Iowa City.—p. 365.
Immediate Repair of Flexor Tendons. R. E. Speirs, Dodge City.—p. 370.
Biologic and Biochemical Study of Curare: Preliminary Report. M. E. Pusitz, J. L. Lattimore, A. Gold and H. Ebendorf, Topeka.—p. 374.
*Embolic Phenomenon Associated with Bacterial Endocarditis. R. C. Jeffries, Atchison.—p. 379.
Lipoid Pneumonia: Report of Case. R. M. Carr, Junction City.—p. 381.

Embolic Phenomenon with Bacterial Endocarditis.—Jeffries believes that the difficulty in the diagnosis of subacute or chronic endocarditis is in most instances due to the absence of symptoms and the fact that a cardiac murmur in fever is not proof of endocarditis. The general septicemic and pyemic symptoms are often ascertained at a late date in the course of the disease. Thus, if the various types of endocarditis are to be recognized clinically all the important physical signs and symptoms of emboli must be considered. The recognition of embolic phenomena as sequels to endocardiac disease is diligently sought for in those cases in which endocardial foci are known to be present or suspected. In such instances they lend confirmatory evidence. Generally the symptoms and physical signs of emboli vary rapidly and are mechanical or secondarily suppurative in effect. Emboli may be single or multiple. It is often difficult to be certain whether symptoms are of septicemic or embolic origin, particularly when splenic enlargement, hematuria or purpura occurs. Purulent invasion of the tissues about the joints is a frequent occurrence in the streptococcic type. Such an incident is quite distinct from petechiae, and infarction must also be distinguished. Although petechiae are often regarded as of embolic origin there is no proof of this. A perivascular reaction to an exotoxin in the capillary arterial bed is the most plausible explanation, probably representing an allergic phase. Perivascular lesions which occur about the joints and produce erythema and pain with occasional effusion into the joint cavity are of great clinical

importance. These little episodes, which usually clear up in three or four days, may be the one crucial symptom offered in evidence for the final determining diagnosis. Two cases of subacute bacterial endocarditis are presented which illustrate early embolic phenomena.

Maine Medical Association Journal, Portland

31:235-266 (Sept.) 1940

Psychotherapy in General Medical Practice. M. R. Kaufman, Boston.—p. 235.
Clinical Analysis of Insulin Hypoglycemic Shock Therapy for Schizophrenia at the Bangor State Hospital from Dec. 1, 1937, to Jan. 1, 1940: Preliminary Report with Brief Review of Literature. E. Blank, Bangor.—p. 240.
Subdiaphragmatic Air as Sign of Perforated Peptic Ulcer. H. G. Hadley, Washington, D. C.—p. 246.

North Carolina Medical Journal, Winston-Salem

1:463-522 (Sept.) 1940

Birth Control in the North Carolina Health Department. G. M. Cooper, Raleigh.—p. 463.
Prevenception, the Health Department and the Practicing Physician. W. P. Richardson and D. Klaiss, Chapel Hill.—p. 468.
Appendicitis: The Two P's and the Highest Mortality in the World. D. B. Cobb, Goldsboro.—p. 472.
Headache. B. W. Fassett, Durham.—p. 478.
Fibrous Cavernositis (Peyronie's Disease). R. W. McKay, Charlotte.—p. 484.
Diphtheria in North Carolina. E. Lupton, Raleigh.—p. 487.

Oklahoma State Medical Assn. Jour., Oklahoma City

33:1-58 (Sept.) 1940

Sanatorium Care. F. P. Baker, Talihina.—p. 1.
Leprosy in Oklahoma: Case Report. O. G. Hazel and W. M. Hull, Oklahoma City.—p. 3.
Advantages and Disadvantages of Prostatic Resection. B. A. Hayes, Oklahoma City.—p. 7.
Artificial Pneumothorax in Nontuberculous Disease of Lung. P. B. Cameron, Tulsa.—p. 10.
The General Practitioner's Practice with Macrocytic Anemia. J. R. Taylor, Kingfisher.—p. 13.

Pennsylvania Medical Journal, Harrisburg

43:1665-1896 (Sept.) 1940

Appraisal of Children After Birth Injury. B. Crothers, Boston.—p. 1677.
Some Everyday Problems in Otolaryngology. J. B. McMurray, Washington.—p. 1690.
Placenta Praevia: Factors Leading to Death in Thirty-Nine Cases. R. A. Kimbrough Jr. and P. Tompkins, Philadelphia.—p. 1694.
Treatment of Anemias Other Than Addisonian Pernicious Anemia. A. J. Creskoff, Philadelphia.—p. 1697.
Diabetes: V. Use of Protamine Zinc Insulin in Children. G. Booth, Pittsburgh.—p. 1701.
Radiologic Gastrointestinal Studies in Eczema. A. Strickler and N. O'Farrell, Philadelphia.—p. 1703.
Perforated Peptic Ulcer. F. M. Pugliese, Wilkes-Barre.—p. 1709.
*Use of Testosterone Propionate in Treatment of Premenopausal Dysfunctional Uterine Bleeding. C. Mazer and M. Mazer, Philadelphia.—p. 1713.

Testosterone Propionate for Uterine Bleeding.—The Mazers list the advantages of testosterone therapy for the treatment of premenopausal dysfunctional uterine bleeding as follows: 1. It obviates the need of applying radium or the use of x-rays, which is usually followed by severe climacteric symptoms. 2. It does not cause sudden and permanent amenorrhea. 3. It does not require hospitalization and is therefore readily accepted by most patients. The Mazers find that smaller doses, a total of from 50 to 200 mg. given over a month, are effective and do not evoke masculinizing changes. Testosterone proprionate relieves dysfunctional uterine bleeding in about 50 per cent of the patients who submit to a month's treatment. The modus operandi of the smaller doses in controlling uterine bleeding of the dysfunctional type is either through the ability of the product to neutralize the continuous action of estrogen on the müllerian tract or through inhibition of the unknown endometrial bleeding factor. Regardless of dosage, it cannot rejuvenate aging ovaries or stimulate the ovaries of younger women to biphasic activity; therefore its influence on dysfunctional uterine bleeding is temporary but long enough to permit natural readjustment to take place. Failure of readjustment results in recurrences. The authors treated sixty-four women, forty-eight of premenopausal age and sixteen younger women, with testosterone propionate in sesame oil given intramuscularly every other day for one month. Forty-four women received a total of from 50 to 200 mg. and twenty from 300 to 600 mg. Thirty-five preliminary curettages were performed as an office procedure to eliminate malignant growths. The remaining women refused to submit to a curettage. A cure was considered to have been effected if the abnormal uterine bleeding ceased during the month of treatment and did not recur for at least three months after its withdrawal. The follow-up period ranged from three to nineteen months with an average of 7.6 months. Forty-two of the sixty-four patients (66 per cent) were cured and twenty-two (34 per cent) were not or were only temporarily improved. Twenty-seven, or 77 per cent, of the thirty-five women who were curetted remained well during the follow-up period, whereas only fifteen of the twenty-nine noncuretted patients remained well for this length of time. This indicates that in 25 per cent curettage alone arrested the dysfunctional uterine bleeding for a period of three or more months, at least long enough for the endocrine imbalance to adjust itself. This is in accord with the authors' experience with eighty-two metrorrhagic women who had received no other treatment than curettage. Larger doses of testosterone did not yield better results; fourteen noncuretted patients received the larger doses with a cure in seven, and fifteen noncuretted patients received the smaller doses with a cure in eight. Seven of the forty-two cured patients had recurrences of uterine bleeding in less than six months after withdrawal of treatment. There were no constitutional ill effects among the sixty-four treated patients. Four patients conceived within one to ten months after withdrawal of treatment. Three of them were delivered of normal infants and one had an induced abortion. The climacteric symptoms complained of by some patients were not influenced even by the larger doses employed.

Quarterly J. of Studies on Alcohol, New Haven, Conn.

1:201-412 (Sept.) 1940

Metabolism of Alcohol: Review. T. M. Carpenter, Washington, D. C.—p. 201.
Food Value of Ethyl Alcohol. H. H. Mitchell and Elizabeth G. Curzon, Urbana, Ill.—p. 227.
Hospitalized Patients with Alcohol Poisoning. Marta Fraenkel, New York.—p. 246.
Delirium Tremens. H. Wortis, New York.—p. 251.
Availability of Ethyl Alcohol for Human Brain Oxidations. W. Goldfarb and J. Wortis, New York.—p. 268.
Analysis of Psychologic Experiments on Effects of Alcohol. E. M. Jellinek and R. A. McFarland, Boston.—p. 272.

Radiology, Syracuse, N. Y.

35:261-390 (Sept.) 1940

*Lipoid Pneumonitis. B. R. Kirklin, Rochester, Minn.—p. 261.
Diagnosis and Treatment of Cancer of Tonsil. W. L. Mattick, Buffalo.—p. 268.
Bilateral Hypernephroma. J. F. Elward and R. L. Spire, Washington, D. C.—p. 274.
Physical Doses and Biologic Doses. M. Ponzio, Turin, Italy; translation by E. T. Leddy, Rochester, Minn.—p. 282.
Cardiovascular Dynamics: Roentgen Kymographic Study. S. Brown, J. E. McCarthy and A. Fine, Cincinnati.—p. 290.
Report of Few Recent Experiments on Biologic Effects of Magnetic Fields. M. Lenzi, Modena, Italy; translated and revised for publication under supervision of G. Failla, New York.—p. 307.
*Roentgenologic Aspects of Metastases. M. J. Hubeny and M. Mass, Chicago.—p. 315.
Use of Fast Neutrons in Treatment of Malignant Disease: Preliminary Report on Use of Fast Neutrons in Treatment of Malignant Disease. R. S. Stone, J. H. Lawrence and P. C. Aebersold, San Francisco.—p. 322.
Multiple Cystic Tuberculosis of Bones: Its Roentgen Picture and Reparative Process as Seen in Serial Roentgenograms. J. L. Law, Ann Arbor, Mich.—p. 328.
Clinical Application of Urinary Dynamics. E. L. Shiflett and D. Y. Keith, Louisville, Ky.—p. 336.
Roentgen Visualization of Some Commoner Lesions of Lower Genito-Urinary Tract. L. E. Sorrell, Birmingham, Ala.—p. 341.
Postrenal Anuria Following Roentgen Therapy for Pelvic Tumors. G. W. Chamberlin, F. L. Payne and L. W. Stevens, Philadelphia.—p. 346.
Blocking of Ureters in Intravenous Pyelography by Means of Filling Bladder with Oil. J. Arendt and L. A. Maslow, Chicago.—p. 350.

Lipoid Pneumonitis.—Kirklin points out that since 1920 it has been known that certain oils when introduced into the lungs are capable of causing severe reactive changes in the pulmonary tissues. Such reactions were produced experimentally by Guieysse-Pellissier with intratracheal injections of olive oil, and later by Corper and Freed. The clinical significance of these experiments was not fully appreciated at first and no one sus-

pected that lipoids in food or commonly administered intranasal and gastrointestinal medicaments might be aspirated into the pulmonary parenchyma and there produce grave organic changes. Not less than seventy-two proved cases of lipoid pneumonitis or pneumonia have been reported within the last six years. Available evidence indicates that lipoid pneumonitis is not merely a pathologic curiosity but a rather common condition. To the roentgenologist the disease is of the utmost interest, for he has the most favorable opportunity to establish or suggest the diagnosis and he can recall many instances from the past in which the disorder was not recognized because its existence was not known. The x-ray manifestations vary according to the stage of the disease and the presence or absence of complicating bronchopneumonia. In early, mild, uncomplicated cases, fleck-like shadows appear in the basal and central portions of both lower lobes, often predominating on the right and sometimes involving the right middle lobe. The flecks extend to the periphery of the lung, and the entire appearance, described by Davis as "miliary mottling," is attributable to the alveoli with their thickened walls and phagocytosed lipoid contents. When the disease progresses the bronchovascular-lymphatic markings become more accentuated and nodulated, and in severe cases gross, irregularly shaped, rather dense, discrete and confluent shadows of consolidations are interspersed through the region. In chronic and severe cases there is evidence of fibrosis, with strandlike shadows along the bronchovascular trunks together with dense, sharply defined, irregular or rounded shadows. These vary in size, number and distribution but are often largest or most numerous in the hilar regions. Signs of local atelectasis, compensatory emphysema or effusion may be present. As a result of fibrous contraction, an entire lobe may be represented by the dense rounded shadow of a tumor-like mass. When bronchopneumonia supervenes the x-ray signs become more extensive and complex in ratio to the amount, intensity and site of bronchopneumonic involvement. The x-ray diagnosis must differentiate between tuberculosis, miliary tuberculosis, miliary metastasis, bronchiolitis obliterans, bronchiectasis, primary carcinoma of the lung, malignant metastasis and pneumoconiosis. In considering the last mentioned the roentgenologist will not be entirely wrong, although he will be thinking of silicosis or anthracosis instead of lipoidosis. The diagnosis of lipoid pneumonia, like that of many other diseases, requires chiefly that the disorder be considered among the alternatives.

Roentgenologic Aspects of Metastases.—Hubeny and Mass maintain that the estimated incidence of skeletal and pulmonary metastases fell far short from the actual incidence in their 1,365 cases of malignant disease. Approximately 74 per cent of their cases of skeletal or pulmonary metastases showed this roentgenographically. This is a considerable increase over previous estimates. Analysis of cases of carcinoma of the breast and prostate show that there are no dependable criteria for rationalizing metastatic phenomena. Among the 1,365 cases, 167 showed skeletal metastases—an incidence of 12 per cent. In eighty-three cases of carcinoma of the esophagus, seven instances of bone metastases were encountered. In twenty-three cases of lymphosarcoma, seven showed skeletal involvement, an incidence of 30 per cent. Carcinoma of the liver (cholangiocellular and hepatocellular) presented an incidence of 11.5 per cent (three of twenty-six cases). In sixty-nine cases of carcinoma of the pancreas, three were found to have bone deposits. In sixteen cases of osteogenic sarcoma examined at necropsy, two cases of distant skeletal metastases were recorded. Four of sixteen cases of carcinoma of the testes showed metastases to bone. In epidermoid carcinomas from the oral cavity, nasopharynx and skin seven instances of skeletal metastases were found among twenty-five cases. In twenty-three cases of carcinoma of the urinary bladder, four instances of skeletal metastases were encountered. Among 150 cases of bronchogenic carcinoma there were thirty-six cases with skeletal metastases. Skeletal metastasis was equally high, in comparison to the heretofore reported incidence, among cases of carcinoma of other organs. A higher incidence of skeletal metastasis is undoubtedly found in necropsy material, but these metastatic foci are present long before the case comes to necropsy and can be found when a diligent search is made. Whether unrecognized skeletal metastases may in some measure explain deaths from relatively insignificant primary growths is not clear, but certainly a profound effect is exerted on the function of the bone marrow. There were 359 instances of pulmonary metastases in the entire series, an incidence of 27.6 per cent. There were ninety-seven cases of carcinoma of the prostate; twenty-three of these were found incidentally at postmortem and in three skeletal metastases with no other metastatic involvement was present not even in the regional lymph nodes. Of the remaining seventy-four cases, thirty-three presented postmortem evidence of metastases to the skeleton, lung, pleura or intrathoracic lymph nodes. Roentgenograms were taken in twenty-four of these thirty-three cases and in sixteen diagnostic x-ray signs of pulmonary or skeletal metastases were present. There were intrathoracic metastases in twenty-four (70 per cent) as compared with 50 per cent observed roentgenographically. In thirteen of these there were no skeletal metastases and nine of them involved the lung parenchyma. This is contrary to the opinions expressed by Bumpus and others that pulmonary metastases probably never occur without associated skeletal involvement. The first clue of a cancer of the prostate in one of the cases studied came from a supraclavicular node. A similar condition existed among the mammary carcinomas; of seventy-seven cases of carcinoma of the breast, sixty-three cases presented evidence of skeletal or intrathoracic involvement (81 per cent). The authors conclude that it is unwarranted to suppose that skeletal metastases are late manifestations. The roentgenologist found a higher incidence of skeletal metastases than the pathologist. Pain may precede an observable skeletal lesion by from three to eighteen months. Skeletal manifestation after surgery may in many instances be evidence of omission on the part of the surgeon and roentgenologist, as many months are usually required for a skeletal lesion to assume obvious proportions. Therefore painstaking observations should be made. The authors think that the patient's life expectancy may actually be diminished by radical surgical procedures when existing skeletal metastases are existent but not obvious, at which time radical surgical procedures are not advisable.

Rhode Island Medical Journal, Providence

23:145-162 (Sept.) 1940

Circle of Willis: Its Angles and Its Aneurysms. C. A. McDonald and M. Korb, Providence.—p. 145.
Reduction of Fractures of Acetabulum with Penetration of Head of Femur into Pelvis: Report of Three Cases. R. L. Maynard, Burlington, Vt.—p. 150.

Southern Surgeon, Atlanta, Ga.

9:697-774 (Oct.) 1940

Breast Tumors. T. C. Davison and F. F. Rudder, Atlanta, Ga.—p. 697.
Surgery in Diseases of Lungs and Pleura. A. Lambert, New York.—p. 710.
Spinal Meningiomas: Report of Four Cases, Three of Which Were in Negroes. F. K. Bradford, Houston, Texas.—p. 722.
Experimental Study of Embolic Effects of Air and of Carbon Dioxide. R. M. Moore and C. W. Braselton Jr., Galveston, Texas.—p. 733.
Surgical Treatment of Pulmonary Tuberculosis with End Results. H. Acuff, Knoxville, Tenn.—p. 738.
Intravertebral and Intrathoracic Blastomycoma Simulating Dumbbell Tumor. W. M. Craig, M. B. Dockerty and S. W. Harrington, Rochester, Minn.—p. 759.

Southwestern Medicine, El Paso, Texas

24:287-318 (Sept.) 1940

Masquerades of Bronchiogenic Carcinoma. W. S. Middleton, Madison, Wis.—p. 287.
Spirochetal Bronchitis. G. H. Hess, Bisbee, Ariz.—p. 296.
Infant Feeding. R. L. Jackson, Iowa City.—p. 298.
Incidence of Agglutinins for Proteus OX19. R. A. Green, E. L. Breazeale and H. B. Harding, Tucson, Ariz.—p. 300.
Some Actions of Alcohol. W. R. Counts, Amonate, Va.—p. 301.

Tennessee State Medical Assn. Journal, Nashville

33:333-374 (Sept.) 1940

Illustrative Lesions About the Sella Turcica and Optic Chiasm. N. Gotten, Memphis.—p. 333.
Contraception: Medical Problems of Growing Importance. H. H. Jenkins, Knoxville.—p. 342.
Contact Infections in Children. W. E. Van Order, Chattanooga.—p. 350.
Analysis of Metrazol Therapy, Together with Theory of Interpretation. J. F. Blalock Jr., O. S. Hauk and P. L. Boynton, Nashville.—p. 353.

FOREIGN

An asterisk (*) before a title indicates that the article is abstracted below. Single case reports and trials of new drugs are usually omitted.

British Medical Journal, London

2:307-344 (Sept. 7) 1940

Nonpenetrating Injuries of Heart. R. G. Anderson.—p. 307.
Insulin Treatment of Schizophrenia in Wartime. J. S. McGregor and R. A. Sandison.—p. 310.
Spontaneous Pneumothorax Simulating Coronary Disease. G. Bourne.—p. 313.
Gold Therapy in Rheumatoid Arthritis. P. Ellman, J. S. Lawrence and G. P. Thorold.—p. 314.
Wartime Precautions for the Diabetic. R. D. Lawrence.—p. 316.
Phrenicocostal Sinus Pneumonia. G. R. Osborn.—p. 317.

2:345-372 (Sept. 14) 1940

Local Anesthesia in General Surgery. H. Dodd.—p. 345.
Cerebral Thrombophlebitis. C. P. Symonds.—p. 348.
Possibilities of Nerve Grafting. F. H. Bentley and Margaret Hill.—p. 352.
Fulminating Septicemia Associated with Purpura and Adrenal Hemorrhage (Waterhouse-Friderichsen Syndrome). J. F. Hughes.—p. 353.
*Eleven Years of Diphtheria Immunization in a Rural District. G. Nicholson and Audrey Z. Baker.—p. 354.

Diphtheria Immunization in a Rural District.—Nicholson and Baker report the results of eleven years of diphtheria immunization in the rural district and borough of Tiverton. They traced the annual incidence of diphtheria for the section since 1912 and find that there were sharp and definite peaks in 1913, 1921 and 1929. The cyclic peak years appear to be regular and from the data the next peak was to be expected in 1937. Neither in that year nor in the two subsequent years did any increase occur. Inoculations were begun during the 1929 epidemic and have been continued ever since, a few schools being treated each year. By the end of 1939 approximately 4,000 children less than 15 years of age had been inoculated; that is, some 45 per cent of the child population has been protected. The Ministry of Health (1940) considers that, if 75 per cent of all children less than 15 years of age were immune, the disease would be abolished. The authors believe that the absence of a peak in 1937 was due to the protective measures taken and has not been merely a fortuitous occurrence. Three instances occurred in the district in which the only uninoculated child in a household contracted diphtheria, whereas the remaining children escaped. Four children in one village contracted severe faucial diphtheria about one month after inoculation, but no case of clinical diphtheria occurred in the district in any child who had been inoculated three or more months previously. Several outbreaks were terminated in various villages by means of inoculation. Since inoculation, an occasional sporadic case of diphtheria has occurred in a village, sometimes in a visitor, with no cases following, whereas prior to inoculation cases usually occurred in groups. With regard to compulsory immunization the authors feel that it has yet to be shown that this is really necessary. Lectures to parents should prove more efficacious than the mere issuance of pamphlets, which are not always read. Since 1934 it has been their practice to carry out a follow-up campaign in the borough at intervals of two years, when it is necessary to deal only with the junior schools. Usually about 150 children are inoculated on each occasion.

Lancet, London

2:287-316 (Sept. 7) 1940

Plaster of Paris. G. R. Girdlestone.—p. 287.
Types of Tubercle Bacilli in Pulmonary Tuberculosis in Northeast Scotland. A. S. Griffith and J. Smith.—p. 291.
Test for Effective Sterilization of Dressings. R. J. Willan.—p. 294.
*Preparation and Use of Human Serum for Blood Transfusion in Shock. J. W. Clegg and J. H. Dible.—p. 294.
*Effects of Arterial Ligature on Vasomotor System. R. Leriche and M. G. Werquin.—p. 296.
Relapsing Cerebrospinal Fever: Failure of Chemotherapy. D. T. Thomas.—p. 297.

Preparation of Serum for Transfusion in Shock.—Clegg and Dible point out that the use of stored blood is limited by its rapid deterioration and that it had been advocated to separate the plasma from stored blood and use it as an alternative to whole blood. However, the resulting plasma-saline-citrate mixture has disadvantages. Among others, the fibrinogen fraction is unstable and precipitates and thus the plasma solution comes to contain particulate matter. The authors tried to produce a plasma or serum suitable for the treatment of shock. The usual methods of filtering the plasma-saline mixture proved unsatisfactory for large-scale work: either the filter becomes blocked with fibrin or the filtrate, which is at first clear, develops a precipitate on standing. Even when only a small quantity is filtered, the fibrinogen may precipitate after a few hours or days. Since it seemed difficult to keep the fibrinogen in solution and since this forms only a small fraction of the total protein, the authors decided to eliminate it and convert the plasma into serum by precipitating the fibrinogen with calcium. In this way they have prepared a serum which appears to have all the clinical advantages of plasma. In addition it passes quickly and easily through a bacterial filter, is sterile and contains no particulate matter, and no filter is used when administering it. Plasma from group A and group O donors has been used and the resulting serum administered to recipients of a different group without reactions. The authors give a detailed description of the technic of preparing serum from stored blood. The advantages of this process are that the serum is sterile, is of a satisfactorily high protein content and can be given to patients irrespective of their blood groups. The solution seems to remain free of particulate matter. The process utilizes blood which has been in the bank too long to be used for whole-blood transfusion, thus effecting a big economy.

Effects of Arterial Ligation on Vasomotor System.—According to Leriche and Werquin, arterial wounds are usually treated by direct ligation, but insufficient attention has hitherto been given to the vasomotor effects in the limb supplied by the artery. The authors became convinced of the importance of these effects. When an artery has been ligated, the resultant thrombosis makes the distal part of the limb cold, cyanotic and weak. A ligature acts as a severe trauma and produces reflex vasoconstriction distally; this reflex can be removed by resection of the obliterated length of the affected artery. The wound, dry before, starts to ooze blood as soon as the thrombosed artery is removed; nor is the effect passive or paralytic, for the blood is circulating more quickly and the local temperature is increased. This is not purely of physiologic interest; it is a practical aspect of arterial ligation, gangrene and ischemia. The vasoconstriction reflex can be abolished by arterial section between ligatures, by periarterial sympathectomy above the lesion, by anesthetic infiltration of the adventitious coat, by regional infiltration of the sympathetic system or by section and ganglionectomy. Ischemic gangrene should no longer be inevitable, and the risk attendant on arterial ligation should be much lessened. Of primary importance in the reestablishment of circulation are the existence and the patency of intact collaterals. The main artery must be free from extensive thrombosis; ligation must therefore be performed under aseptic conditions to limit the chances of thrombosis. Extensive trauma and extensive excision of muscle both cause destruction of collaterals, and a large hematoma may compress them; in either case gangrene may result. This is why ligation in war wounds is particularly liable to be followed by gangrene. Failure in the reestablishment of circulation in a limb may also be contributed to by lowering of the general blood pressure by hemorrhage or shock. A blood loss of from 1,000 to 2,000 cc. is common in war wounds and causes such hypotension that ischemia below the ligature is just about fatal. Blood transfusion of from 400 to 500 cc. or the slow intravenous infusion of 1,000 cc. or more of warm serum will counteract anemia but may not restore the constricted peripheral circulation. Double splanchnic anesthesia might be tried. The disturbances following ligation may be grouped under three headings: 1. A mechanical syndrome grading from massive gangrene down to localized necrosis in muscles causing orthopedic troubles later. 2. Functional disorders, such as intermittent claudication. 3. Vasomotor disorders, such as cyanosis, trophic troubles and muscular paresis. The best prophylaxis would be the substitution of suture for ligation; this, however, is generally impossible in war wounds. The next best thing is limited resection of the artery between two ligatures, the blood pressure at the same time being maintained to help the rapid flow of the blood back into the limb. Periarterial sympathectomy above the ligature is also useful, as is infiltration or section of the regional sympathetic plexus. It is important to remember the time limit; if infiltration is to be done, it must be done at once. Delay is

fatal, because the tissues die quickly. Infiltration of the cervical or the lumbar sympathetic is more necessary than warming the patient with cotton-wool or with radiant heat. It is not the skin that wants the warmth so much as the deep tissues.

Medical Journal of Australia, Sydney

2:187-208 (Aug. 31) 1940

Plea for Reorganization of the Medical Profession. A. E. Brown.—p. 187.
Behavior of Blood Platelets in Thyrotoxicosis. P. Woodruff.—p. 190.

Revista de Chirurgie, Bucharest

43:305-464 (May-June) 1940. **Partial Index**

*Myelography in Diagnosis of Spinal Fractures. Amza Jianu and T. Firica.—p. 305.
Fibrocystic Osteitis of Rib: Case. A. Cosacesco.—p. 313.

Myelography in Diagnosis of Spinal Fractures.—Amza Jianu and Firica discuss the technic of x-ray examination of the spine after intraspinal injection of iodized oil and the diagnostic value of the procedure in fractures of the spine with nervous symptoms from compression of the cord or the nerve roots. Fractures of this type are frequently associated with posterior herniation of the nucleus pulposus of the intervertebral disks, thickening and calcification of the lateral ligaments and minute displacements of bony fragments which produce compression of nervous tissue but fail to show on an ordinary x-ray examination. Myelography is indicated after failure of early orthopedic treatment. Early myelography is both useless and dangerous. Iodized oil is injected in amounts of 4 or 5 cc. at the level of the lesion suspected or suggested by slight deformity of the vertebra in a plain roentgenogram. Smaller amounts of oil may fail to show partial block of the oil at the seat of the compressing lesion. The roentgenograms are taken after intrathecal injection of iodized oil in the dorsoventral and ventrodorsal positions respectively, and right and left lateral films in the prone and upright positions. They are taken at a distance of 150 or 200 cm. between the plate and the anticathode. Anteroposterior and right and left lateral myelograms taken in the dorsoventral position are of great diagnostic value. They show clearly the partial blocking, even if moderate, at the seat of the lesion. A myelographic diagnosis of the abnormality is an indication for surgical intervention. In the case reported by the author myelography demonstrated a fracture of the fifth lumbar vertebra with compression of the spinal cord by posterior herniation of the nucleus pulposus of the intervertebral disk.

Riforma Medica, Naples

56:705-736 (June 1) 1940

*Behavior of Gastric Secretion in Cholecystitis. A. Gugliucci.—p. 714.
Bronchiogenic Carcinoma: Case. S. Saitta.—p. 719.

Gastric Secretion in Cholecystitis.—Gugliucci employed histamine to determine the hydrochloric acid levels of twenty patients, five with and fifteen without calculus, who had been affected with gallbladder inflammation for a period of from two weeks to eight years, using roentgenoscopy as confirmatory evidence. He found hypochlorhydria in 45 per cent, hyperchlorhydria in 15 per cent, a tendency from hypochloric acid deficiency to normal content in 10 per cent and normal levels in 30 per cent. The high percentage of hypochlorhydria and achlorhydria reported in cases in which Ewald's test was used in cholecystic disorders is due, according to the author, to the inferiority of this test to the histamine test. The author believes that histamine is more effective in testing hydrochloric acid content, especially in latent cases of gastric miopragia and in differentiating true from false achlorhydria. In comparative assays histamine repeatedly disclosed hyperchlorhydria when Ewald's test indicated hypochlorhydria or achlorhydria. No regular connection was discovered between the behavior of hydrochloric acid secretions and the presence or absence of calculus. Hence the opinion that hyperchlorhydria is concomitant with cholecystitis involving calculus is not tenable. Greater significance is to be attached to the patient's condition, including his neurovegetative, endocrine and electrolytic behavior, than to the duration of the disorder or to the presence of a calculus. Chemical modifications of hydrochloric acid in cholecystitis tend toward gastric hypochlorhydria. However, no regularity of procedure is ascertainable.

Revista Med.-Quir. de Pat. Femenina, Buenos Aires

16:1-153 (July) 1940

*Theoretical and Experimental Foundations for the Preparation of New Lipoid Antigens in Serodiagnosis of Hydatidosis. M. A. Etcheverry.—p. 1.

New Lipoid Antigens as Serodiagnostic Aids in Hydatidosis.—Etcheverry investigated the complement fixation value of total and fractional lipoid antigens extracted from powdered Taenia echinococcus and Taenia saginata by means of acetone, ether and alcohol. Lipoid antigens extracted from Taenia saginata were found diagnostically superior to those derived from Taenia echinococcus. Alcoholic extracts prepared with the ether insoluble fraction of powdered Taenia saginata were more potent diagnostically than total extracts, displayed no hemolytic power of their own, hindered complement fixation to a less degree and possessed a greater specificity. The addition of cholesterol increased sensitization without impairing specificity. Greatest antigenic power was discovered to inhere in lipoids insoluble in acetone and ether but soluble in alcohol. In fifty-three cases of ascertained hydatidosis, the author using the primarily ether insoluble and alcohol soluble lipoid fraction of Taenia saginata without cholesterol obtained forty-six positive reactions out of fifty-three cases (86.79 per cent). On the other hand, the same fractionated lipoid with the addition of cholesterol furnished fifty-one positive diagnostic reactions (96.22 per cent) in fifty-three cases of established infection. Applying the same cholesterol-strengthened fractional lipoid to seventy-six controls, the author succeeded in securing seventy-three true negative results (96.05 per cent) and only three false positives. The superiority of purifying the antigen by separating from it the ether-soluble fraction can be discerned from the fact that total alcoholic extracts of Taenia saginata injected in sixty-seven proved cases of hydatidosis gave only fifty-three (79.1 per cent) positive reactions. The greater specificity obtainable by employing the fractional lipoid antigens, primarily ether insoluble, was observed in 96.5 per cent of true negative reactions in seventy-six controls compared with a 78.44 per cent true negative diagnostic attainment in fifty-one controls tested by total alcoholic extract. Though unable to define the exact chemical structure of the specific active substance, the author succeeded in localizing it within a definite group of lipoid substances. Extensive laboratory and biographic data accompany the monographic study.

Kinderärztliche Praxis, Leipzig

11:113-142 (April) 1940

*Antirachitic Curative Power of Irradiated Milk. K. Scheer.—p. 113.
Symptomatic Treatment of Serum Collapse. P. von Kiss and I. Flesch.—p. 121.
Sinus Thrombosis as Sequel of Injection? F. Hansen.—p. 119.
Unusual Symptomatology of Sinus Thrombosis. I. Zimányi.—p. 126.
Prophylaxis of Rickets. B. Dominick.—p. 131.
Dental Problems in Pediatrics. G. Matthes.—p. 134.

Antirachitic Action of Irradiated Milk.—Scheer states that the antirachitic effects of irradiated milk have been partly forgotten and that confused ideas exist regarding irradiated milk. Many are of the opinion that irradiated milk has a prophylactic but no therapeutic action. The author demonstrates the great antirachitic power of irradiated milk on the basis of new investigations. He reviews twelve cases of rickets occurring in different seasons of the year. Roentgenograms of five cases show that even severe forms of rickets are cured within a few weeks. The cure is not as rapid as when large doses of irradiated ergosterol are given. Feeding with irradiated milk has the therapeutic effect of the daily administration of about 6,000 international units. The children received the quantity of milk that corresponded to their age and their state of nutrition. They were given no other antirachitic treatment. That irradiated milk exerts no harmful effect has been proved by observations on 500 children. This milk is unchanged in odor and taste. Although the therapeutic action of irradiated milk has been demonstrated, its chief value is in the prophylaxis of rickets, because it can be provided for every child and the expense involved is small.